RENAULT

LOGAN
manufactured since 2009

SANDERO
SANDERO Stepway

with 1.4–1.6 (8V) and 1.6 (16V) engines

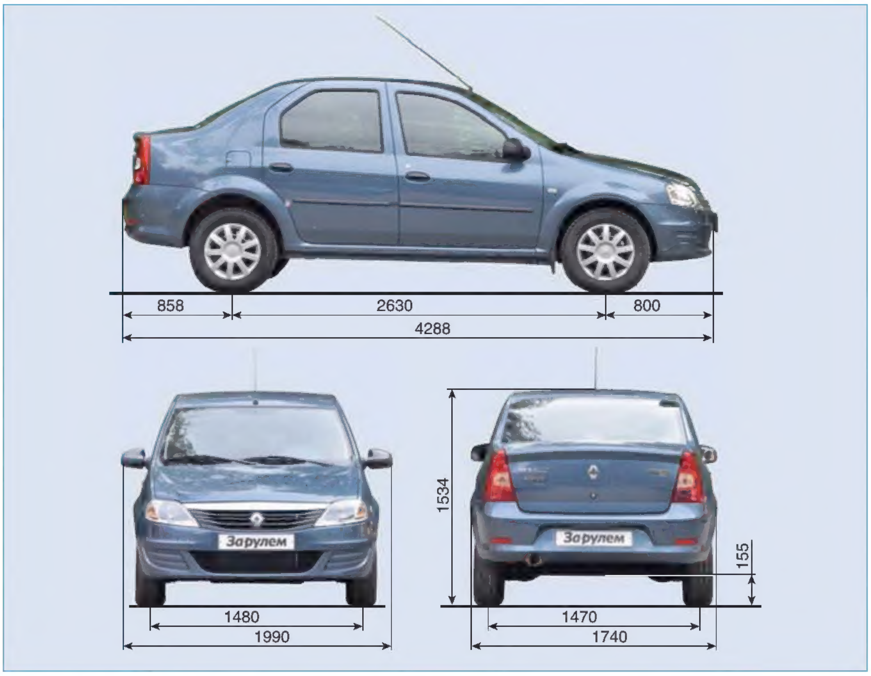
DEVICE
SERVICE
DIAGNOSIS
REPAIR

издательство
За рулем

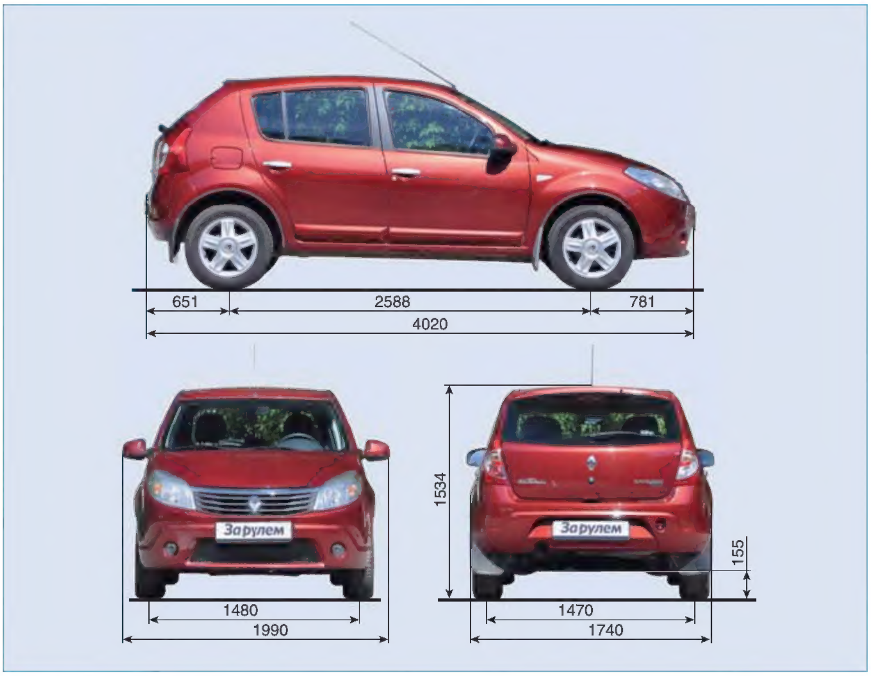
GENERAL INFORMATION

Technical description

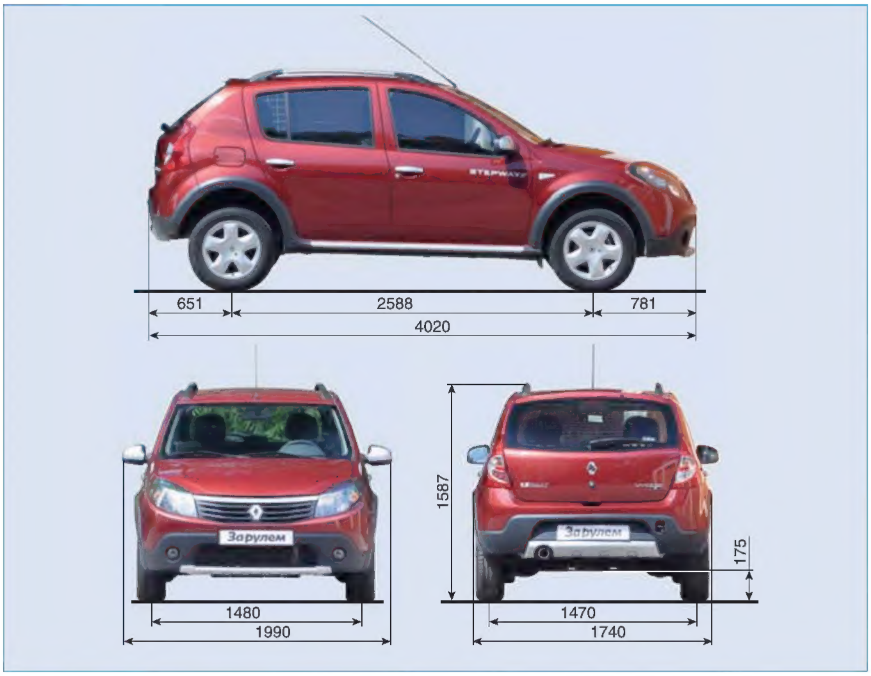
In April 2005 in Moscow the company LLC "Avtoframos" began production of Renault Logan passenger cars ("Renault Logan") with a sedan body, and in December 2009 it started producing the updated Logan. The restyled model differs externally from the previous one by the radiator grille, bumpers, hood, trunk lid, headlights and taillights. Inside, the design of the instrument panel, steering wheel and door trim was changed. Some vehicles began to be fitted with Bosch ABS of the eighth generation with an electronic brakeforce distribution function for emergency braking. Since late 2009, on the Logan platform "Avtoframos" began producing the five-door Sandero hatchback ("Sandero"). Compared with the sedan, the hatchback has a wheelbase that is 42 mm shorter. The components of the Logan and Sandero are standardized by approximately 70%, including a common range of powertrains and transmission. Vehicles are equipped with four-cylinder 8-valve gasoline engines of 1.4 and 1.6 L with power outputs of 55 kW (75 hp) and 62 kW (84 hp) respectively, as well as a 16-valve 1.6 L engine with an output of 75 kW (102 hp). All engines meet Euro-4 emissions standards. Cars with the 1.6 L 16-valve engine are fitted with either a manual or an automatic gearbox.



Overall dimensions of the Logan



Overall dimensions of the Sandero



Overall dimensions of the Sandero Stepway

In 2010, Avtoframos began producing an off-road version of the hatchback – the Sandero Stepway. The car differs from the base model by having a different gearbox and clutch drive design. Different wheel drives are used and ground clearance is increased by 20 mm (due to new shock absorbers and springs). The car also features different headlights, bumpers, roof rails, and decorative sill and wheel-arch trims. Vehicles are fitted with 1.6 L engines (8- and 16-valve) and come with manual and automatic transmissions (automatic available only with the 16-valve engine).

Technical specifications of the vehicles

General information			
Parameter	**Logan**	**Sandero**	**Sandero Stepway**
Body type	sedan	hatchback	hatchback
Number of seats	5	5	5
Number of doors	4	5	5
Curb weight, kg	975–1165*	975–1172*	1062–1193*
Permitted maximum weight, kg	1535–1600*	1470–1575*	1561–1615*
Permissible gross mass of an unbraked towed trailer, kg	525–580 *	565–580 *	565–605 *
Permissible gross weight of the towed trailer, equipped with brakes, kg	1100	1050–1100 *	1050–1100 *
Maximum permissible load on the coupling device, kg	75	75	60
Maximum permissible load on the roof rack (including the weight of the rack), kg	80	80	80
Trunk capacity, L	510	320	320
Top speed, km/h	162–180*	162–180*	162–180*
0–100 km/h acceleration time, s	10.5–13.0*	10.5–13.0*	12,4
Fuel consumption, L/100 km			
urban cycle	9.4–11.8*	9.4–11.8*	10.2–12.1*
highway cycle	5.5–6.7*	5.5–6.7*	6.1–6.6*
combined cycle	6.9–8.4*	6.9–8.4*	7.6–8.6*
Minimum turning radius, m	5,25	5,25	5,25
Fuel tank capacity, L	50	50	50

* Depending on the trim.

Engine

Model	K7J	K7M	K4M
Тип	Gasoline, four-stroke, four-cylinder, inline		
Placement	Front, transverse		
Displacement, cm³	1390	1598	1598
Number of valves	8	8	16
Bore and stroke, mm	79,5×70	79,5×80,5	79,5×80,5
Compression ratio	9,5	9,5	9,8
Rated power, kW (hp) at crankshaft speed, min^{-1}	55 (75) 5500	62 (84) 5500	75 (102) 5750
Maximum torque, N·m at crankshaft speed, min^{-1}	112 3000	124 3000	145 3750
Fuel system	Multi-point fuel injection		
Fuel (octane rating)	Unleaded gasoline with an octane rating of at least 91		
Ignition system	Electronic, part of the engine management system		
Emissions standards	Euro 4		

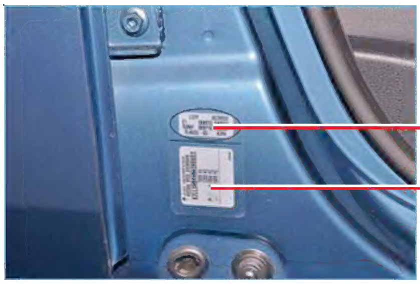
Transmission

Clutch	Single-disc, dry, with a diaphragm spring
Clutch release actuation	Cable; hydraulic (Sandero Stepway)
Transmission model	JH1(1,4); JH3(1,6); JR5 (Sandero Stepway)

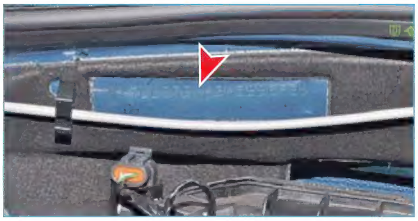
Transmission type	manual	automatic
Number of gears	5	4
Gearbox gear ratios:	JH1; JH3	н.д.
1st gear	3,73	
2nd gear	2,05	
3rd gear	1,39	
4th gear	1,03	
5th gear	0,79	
Reverse gear	3,55	
Final drive ratio	4.21; 4.5 (Sandero Stepway)	
Driven wheels	Shafts with constant velocity joints	

Chassis	
Front suspension	Independent, McPherson-type, with telescopic hydraulic shock absorber struts, coil springs, lower transverse arms and an anti-roll stabilizer
Rear suspension	Semi-independent, with coil springs, telescopic hydraulic shock absorbers and longitudinal arms connected by a U-section cross beam that incorporates a torsion-type anti-roll stabilizer
Wheels	Disc, steel, or alloy
Rim width	6J14 or 6J15
Шины	Radial, tubeless
Tire size	185/70R14 or 185/65R15
Steering system	
Steering gear	Rack-and-pinion with power assist or without power assist
Steering drive	Two tie rods connected by ball joints to the rack and the steering knuckle arms
Number of steering wheel turns with power assist / without power assist	3,2 /4,5
Brake system	
Service brake system	Hydraulic, dual-circuit — diagonal, with a vacuum booster. Some vehicles are equipped with an anti-lock braking system, while others have a brake force regulator in the rear-wheel brake actuators.
Front wheel brake mechanism	Ventilated or non-ventilated disc, with a single-piston floating caliper and automatic adjustment of the clearance between the disc and pads.
Rear wheel braking mechanism	Drum type, with self-adjusting shoes and automatic clearance adjustment between shoes and drum
Parking brake	Manual, cable-operated acting on the rear wheel brake shoes
Electrical equipment	
Electrical system diagram	Single-wire system: the negative terminals of power sources and consumers are connected to the vehicle "ground" (body and powertrain)
Rated voltage, V	12
Rechargeable battery	Starting battery, 70 Ah capacity
Alternator	Alternating current, three-phase with an integrated rectifier block and electronic voltage regulator
Maximum current delivered by the alternator, A	70–150
Mitsubishi starter	With excitation from permanent magnets, an electromagnetic pull-in relay, and a one-way clutch
Valeo starter	With excitation from electromagnets, an electromagnetic pull-in relay, and a one-way clutch

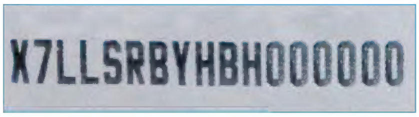
Vehicle registration details



A manufacturer's plate containing vehicle information is affixed to the lower part of the front passenger door pillar.



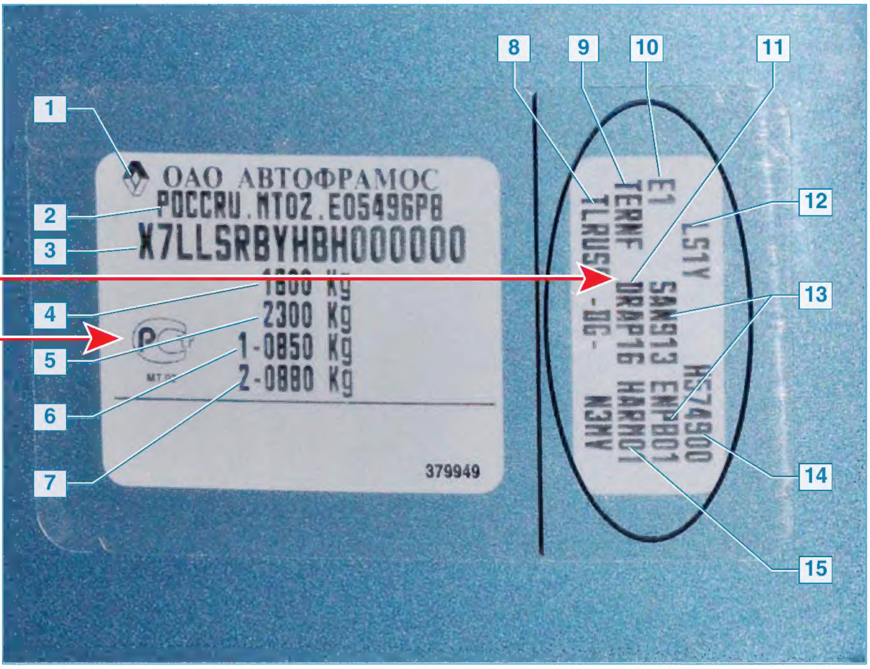
The vehicle identification number (VIN) is located in the engine compartment — stamped on the air intake box shelf.



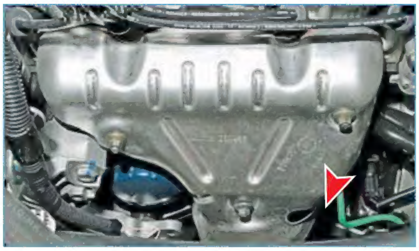
X7LLSRBYHBH000000

Example decoding of the identification number X7LLSRBYHBH000000: X7L – the manufacturer plant code per international standards;**L** – body type (**L** – sedan; **B** – hatchback);**SR** – vehicle model; **B** – presence of an airbag (**A** – driver airbag; **B** – driver and passenger airbags; **4** – no airbag); **YH** – engine model (**HH** – 1.6 (8V) engine; **YH** – 1.6 (16V) engine; **GH** – 1.4 engine);**B** – vehicle model year (**B** – 2011; **A** – 2010); **H000000** – body serial number

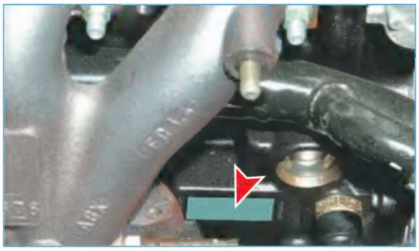
The model and engine number are stamped on the front face of the engine block, near the oil pressure warning sensor.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
ОАО АВТОФРАМОС
РОССRU.MT02.E05496P8
X7LLSRBYHBH000000
1600 Kg
2300 Kg
1-0850 Kg
2-0880 Kg
379949
E1
TERNF
TLRUS-DG-
L51Y
SAN913 ENPB01
DRAP16 HARN01
H574900
N3MY

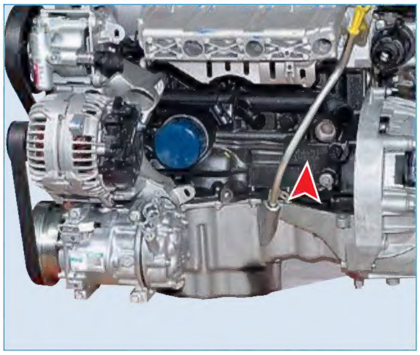
Decoding of the manufacturer plate designations: 1 – manufacturer; **2** – vehicle type approval number; **3** – vehicle identification number (VIN); **4** – permitted maximum vehicle mass; **5** – permitted maximum vehicle mass with a braked t railer; **6** – maximum permissible load on the front axle, kg; **7** – maximum permissible load on the rear axle, kg; **8** – vehicle technical specification code; **9** – body color code (paint number); **10** – trim level code; **11** – vehicle type code; **12** – interior upholstery code; **13** – special equipment code; **14** – factory serial number; **15** – interior color scheme code



Location of the engine number
for 1.4–1.6 (8V)



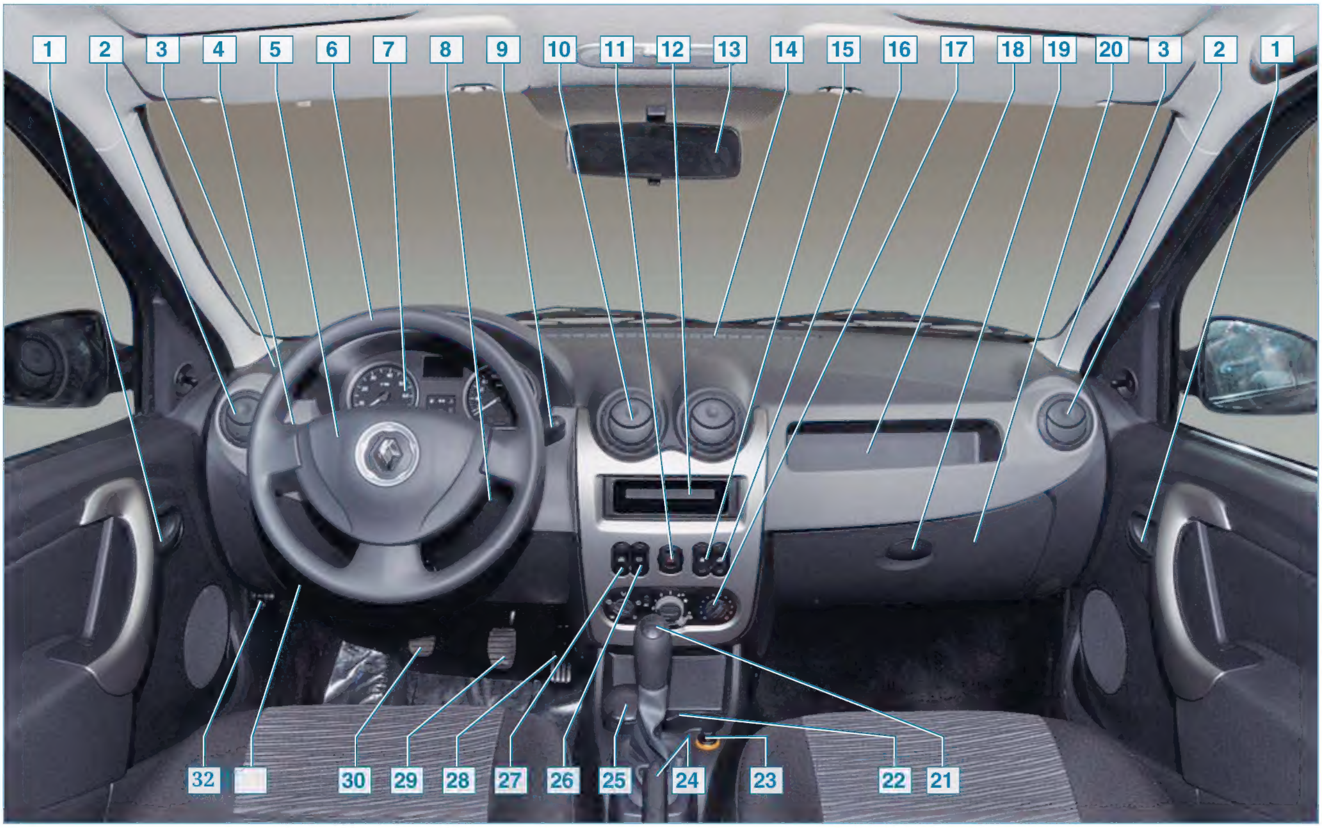
For clarity, the location of the engine number for 1.4–1.6 (8V) is shown with the exhaust manifold heat shield removed.



Location of the engine number for 1.6 (16V) (shown on the removed power unit for clarity)

Equipment and controls

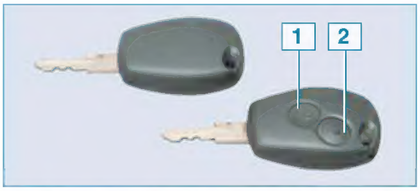
Location of controls and instruments



Controls and instruments: 1 – inner door handle; **2** – side deflector of the heating, ventilation and air conditioning system; **3** – door glass ventilation grille; **4** – steering column switch for headlights and turn indicators, horn switch; **5** – airbag; **6** – steering wheel; **7** – instrument cluster; **8** – ignition switch (lock); **9** – steering-column switch for the windshield washer and wiper and the tailgate window washer (Sandero, Sandero Stepway);**10** – central deflector of the heating, ventilation and air conditioning system; **11** – hazard warning light switch;**12** – location for the head unit of the audio system; **13** – rearview mirror; **14** – windshield ventilation grille; right-side window; **15** – central door lock switch; **16** – right front door power window switch;**17** – heating, ventilation and air conditioning control unit; **18** – small items compartment or designated space for installing the passenger airbag; **19** – glove box handle; **20** – glove box; **21** – gear shift lever; **22** – cup holder; **23** – cigarette lighter; **24** – parking brake lever; **25** – ashtray; **26** – rear window defroster switch;**27** – driver's door power window switch; **28** – accelerator pedal; **29** – brake pedal; **30** – clutch pedal; **31** – headlight beam direction adjuster; **32** – hood lock handle

Car Keys

Two keys come with the vehicle, each of which is used to unlock the front doors and the trunk lid, as well as to operate the ignition. One of the keys has remote control buttons for the central locking system.



Car keys: 1 — button for unlocking the doors; **2** — button for locking the doors

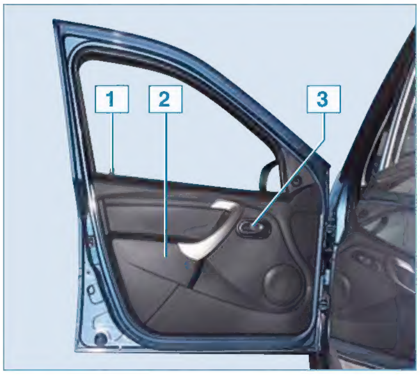
Transponders (electronic keys) are built into the heads of both car keys; their codes are stored in the memory of the immobilizer electronic control unit, which is designed to prevent unauthorized engine starting.

The immobilizer consists of: an indicator, a communication coil, a key, and a switching unit that functions as the immobilizer control unit.

Doors, central lock, power windows

Doors, central lock

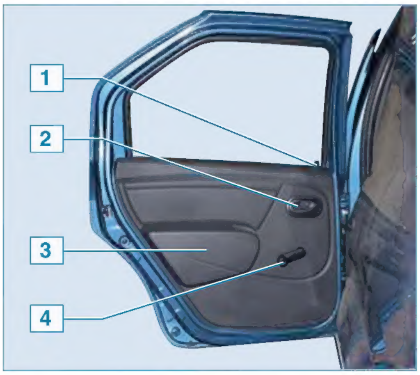
To lock the door locks from outside the vehicle, turn the key in the driver's door lock cylinder clockwise; to unlock, turn it counterclockwise. When the key is turned in the front passenger door lock cylinder or the tailgate lock cylinder (Sandero, Sandero Stepway), only that door's lock is locked (unlocked). You can also lock and unlock all the doors using the remote control of the working key (see "Car keys", p. 11).



Driver's door: 1 – door lock button; **2** – armrest; **3** – interior handle

From inside the vehicle, the locks of all side doors and the luggage compartment door (Sandero, Sandero Stepway) can be locked by pressing the top part of the central locking switch key, located in the central area of the instrument panel (see “Switches,” p. 17). Pressing the lower part of the key unlocks the locks of all doors. The front door lock can be locked by depressing the door lock button.

The front door lock can be locked and unlocked only when the door is closed.

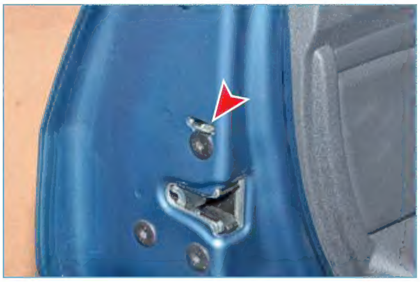


Rear door: 1 – door lock button; **2** – interior handle; **3** – armrest; **4** – window crank handle

The rear door lock can be blocked by depressing the lock button, both on an open and on a closed door.

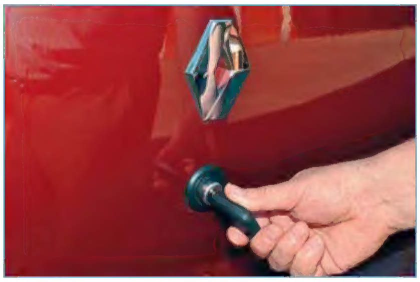
The rear doors are equipped with a n additional lock mechanism that can be used when traveling with children or in other situations where the regular lock does not provide sufficient protection against unwanted door opening.

For this purpose, levers for the additional lock are located on the rear door edges (above the locks).

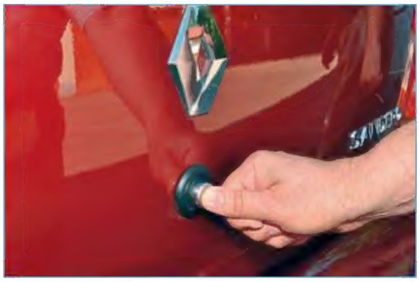


To lock the inner handle of the rear door, move the lever toward the outer door panel. In this case, the rear door can only be opened from the outside when the lock-release button is lifted.

To deactivate the lock, return the lever to its original position. To unlock the trunk lid (Sandero, Sandero Stepway)...



...turn the key in the lock counterclockwise.



Press the lock button...

...lift the tailgate.

Door window lifters

The vehicle is equipped with electric front door window lifters and manual rear door window lifters. In some configurations, electric rear door window lifters may be installed.

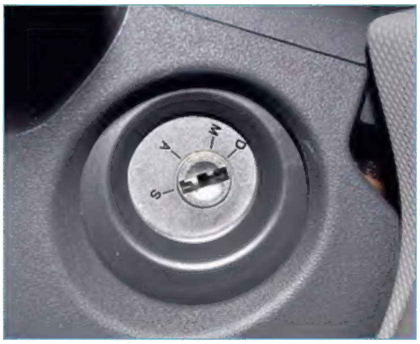
The front door electric window lifters can be operated using the switches located in the central part of the instrument panel (see " Switches", p. 17).

The rear door power windows can be controlled using the switches located in the rear part of the floor tunnel trim (see “Switches,” p. 17).

Door power windows can be operated with the switch buttons only when the ignition is on (key in the ignition lock in position “M”).

Ignition switch (lock)

The ignition switch is located on the right side of the steering column. It is equipped with an anti-theft device that locks the steering shaft when the key is removed from the lock.



The key can be in one of four ignition lock positions: “S” (lock), “A” (parking), “M” (ignition on), and “D” (starter).

The key can be inserted into and removed from the ignition lock only in the "S" position.

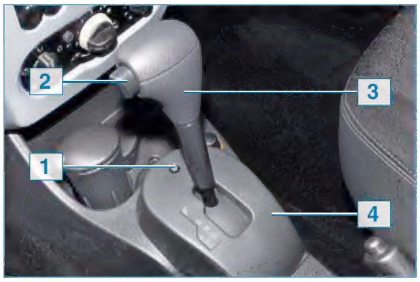
In position “S”, regardless of whether the key is inserted or not, the following power circuits are energized: parking lights, head and fog lights, license plate illumination and instrument panel lighting; the cabin light; the hazard warning lights; the central locking; the main audio unit; and the horn. When the ignition key is removed, the anti-theft locking mechanism that locks the steering shaft may engage.

To lock the steering shaft, remove the key from the ignition and turn the steering wheel in either direction until the locking element clicks. To unlock the shaft, slightly rock the steering wheel right and left while turning the key in the ignition from position “S” to position “A”.

When the key is in the "A" position, in addition to the electrical consumers listed above, the cigarette lighter and heater fan can be turned on. In the "M" position, the ignition is switched on and voltage is supplied to the power circuits of all electrical consumers. In the "D" position, the starter engages. After the engine starts, you must release the ignition key and it will automatically return to the "M" position.

Automatic transmission selector lever

Some vehicles are equipped with an electronically controlled automatic transmission. This transmission also allows gears to be shifted manually in sequence.



Automatic transmission selector lever: 1 – button used when driving on slippery roads; **2** – lock button; **3** – selector lever; **4** – decorative selector cover

For the gearbox to operate in automatic mode, the selector lever must be positioned in the right part of the slot, with four fixed lever positions:

«P» (Parking) – parking; it locks the transmission’s secondary shaft, preventing the vehicle from moving unintentionally.

The “P” position is designed to lock the vehicle’s transmission while parked.

Shift into “P” only after the vehicle has come to a complete stop. The ignition key can be removed only in the “P” position. You can move the selector out of “P” only after turning on the ignition and pressing the brake pedal. To move the selector from “P,” you must press the lock-release button.

«R» (Reverse) – reverse; backing up, the reverse gear is engaged.

You can move the selector into “R” only by pressing the lock-release button. Engage this mode only when the vehicle is completely stopped and the engine is idling.

«N» (Neutral) – neutral position; the gears are disengaged. In this position, the vehicle can be rolled by hand and towed for a short distance.

In the “N” mode, the vehicle may be towed at speeds not exceeding 25 km/h and for distances no greater than 50 km. Towing the vehicle in reverse is prohibited. Towing the vehicle for longer dis-

distances is only permitted with the front wheels lifted off the ground.

«D» (Drive) – forward driving with sequential automatic gear changes. This gear lever position is used for normal driving conditions. The transmission will automatically select gears depending on the driving mode.

Starting the engine of a car with an automatic transmission is permitted only when the gear selector is in the "P" or "N" position and the brake pedal is depressed.

Starting the engine of a car with an automatic transmission by towing or by push-starting is prohibited.

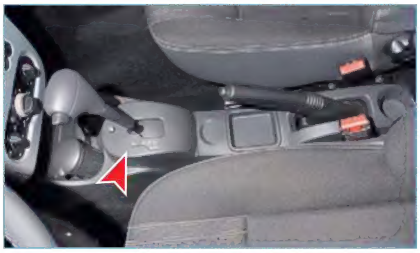
Before moving off, press the brake pedal and move the gear selector to "D." To begin moving, release the brake pedal (the car will start to move slowly on its own). Press the accelerator to increase speed. As speed increases, the transmission will shift gears automatically.

If you need to leave a parked car, press the brake pedal, engage the parking brake, move the gear selector to "P" (while holding the button on the lever), switch off the ignition, and remove the key from the ignition switch.

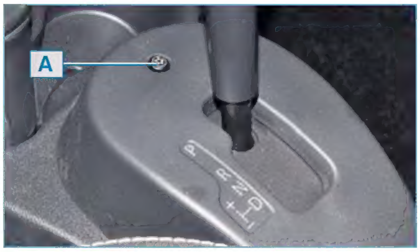
To switch the gearbox from automatic to manual mode, set the selector lever to the “D” position and then move it to the left side of the slot. To engage an upshift, push the lever forward to the “+” position, and to engage a downshift, pull it back to the “–” position.

Each position of the gear selector is shown on the instrument cluster display; in this case it is “N” (neutral).

When manually shifting gears, the automatic control system may consider the selected gear to be incorrect and refuse to engage it. In this case, the gear indication on the display will flash for several seconds to warn you. If a malfunction occurs, to unlock the transmission in the vehicle, there is a provision for releasing the selector lever from the “P” position. To do this, lift the decorative selector cover and press the button located beneath it on the driver’s side, and press the lock button on the lever.



The transmission unlock button is located under the decorative cover at the spot indicated by the arrow



When driving on a road with poor traction, for example in winter when the road is slippery, press button A...

...a snowflake-shaped symbol will then appear on the display

To disable this mode, press the button again.

Instrument cluster

1 – tachometer (engine crankshaft speed indicator). If the needle reaches 6,000 min^{-1}, the rev limiter engages and crankshaft speed above do not grow;

2 – on-board computer display;

3 – multifunctional button. It is used for:

- controlling the data displayed on the screen. A short press of the button switches between the total odometer reading and the trip odometer reading;
- resetting the trip odometer to zero. To do this, display the trip odometer reading, press the button and hold it down for a while;
- setting the exact time. The clock appears on the instrument cluster display when the ignition is on. To set the exact time with the ignition on, repeatedly press button **3** until “Total odometer and time” is shown on the display. There are two ways to set the time. First: when you press and hold button **3**, the value initially changes rapidly—shows the hours and minutes, then only the hours. Second: with a short press of the button, the time changes minute by minute;

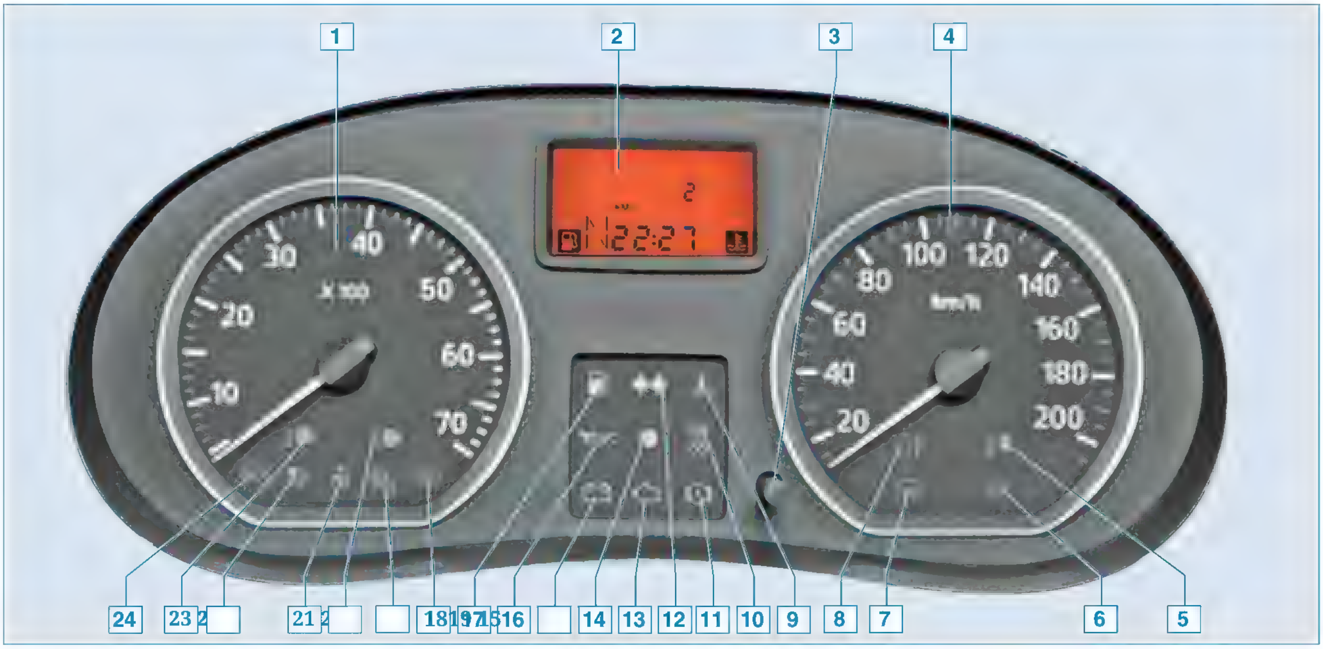
4 – speedometer (indicator of the vehicle's speed);

5 – indicator for turning on the fog lights lights up in green;

6 – indicator unclosed door lights up red when any door is open or not closed properly;

7 – not used;

8 – rear fog lamp indicator illuminates orange;



9 – engine overheating indicator lights red. After starting the engine the indicator should go out. If the indicator stays on, let the engine idle for one to two minutes — the temperature should drop. If the indicator remains lit — stop the engine and check the cooling system;**10 – not used; 11 – parking brake and low brake fluid reservoir level indicator** lights red when the parking brake is engaged and when the brake fluid level in the reservoir is low;

12 – turn signal indicator flashes green when the left or right turn signals are activated and when the hazard warning lights are on;

13 – engine management system fault indicatorlights up amber when the ignition is switched on and then goes out. If the indicator continues to stay lit after the engine is started, or lights up briefly and then goes out, or remains lit continuously while the engine is running, this indicates a fault in the engine management system. To diagnose and rectify the fault, you should have the vehicle inspected at a service station as soon as possible;

14 – immobilizer status indicatorlights red. After switching on the ignition, the indicator remains steadily lit for three seconds and then goes out. If the indicator continues to stay lit or flashes after three seconds, the immobilizer is faulty. In that case, you should have the vehicle inspected at a service station;**15 – battery charge absence indicator**lights red when illuminates when the ignition is switched on and goes out after the engine starts. The indicator lighting while the engine is running indicates a fault in the battery charging circuit, a broken accessory drive belt, etc.;

16 – low (warning) engine oil pressure indicator lights red when the ignition is switched on and goes out after the engine starts. The indicator lighting while the engine is running indicates insufficient pressure in the engine lubrication system. In this case you must stop the engine and check the oil level in the engine oil pan. If the level is below the minimum, add oil and restart the engine.

If the indicator remains lit, stop the engine. Determine the cause of the fault
(see "Troubleshooting," p. 55) and correct it. If the malfunction cannot be resolved, you must contact a service station;
17 – low fuel level warning light illuminates orange when the engine is started and goes out after three seconds. If the warning light stays on, fuel must be added to the tank;

18 – indicator for activation of the rear window defroster lights up red;
19 – front passenger airbag deactivation indicator lights up orange;
20 – high-beam indicator light– high beam headlight indicator lights up blue when the high beams are turned on;
21 – driver seat belt reminder lights up orange when activated

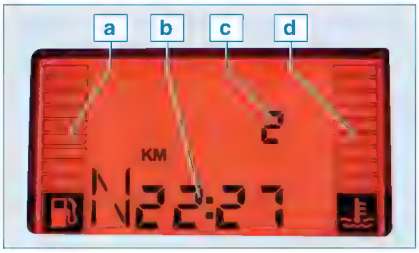
ignition and when the vehicle speed exceeds 10 km/h if the driver's seat belt is not fastened;

22 – airbag warning light illuminates orange when the ignition is switched on and goes out after a few seconds. If the warning light does not come on after switching on the ignition or stays on while driving, there is a fault in the system. In this case, you should contact a service center to have the fault rectified;

23 – low beam indicator lights green;

24 – anti-lock braking system (ABS) indicatorlights orange when the ignition is switched on and then goes out. If the indicator lights while driving, there is a fault in the system. Braking will then operate as on a vehicle not equipped with ABS.

ON-BOARD COMPUTER DISPLAY



Display of information on the display: **a** – fuel gauge for the fuel tank. When the fuel tank is full, all rectangles are dark;**b** – clock; **c** – on-board computer information; **d** – engine coolant temperature gauge. During normal engine operation, four rectangles are dark. Do not allow the engine to operate in an overheating condition

When you press the button located on the end of the right-hand steering-column stalk (see “ Steering-column stalks”, p. 20) repeatedly, the onboard computer displays the following information:

– total mileage counter;

– average fuel tion (in l/100 km) reset of the on-board e average fuel consumption value is displayed on the screen after the vehicle has traveled 400 m, taking into account the distance traveled and the amount of fuel consumed since the last reset of the readings;

– calculated reserve g driving range on the tank (in km). When e remaining range, the average fuel consumption since the last reset of the trip data is taken into account. T value is displayed on the screen after the vehicle has traveled 400 m;

– distance traveled (in km) after res- of the last reset onboard computer;

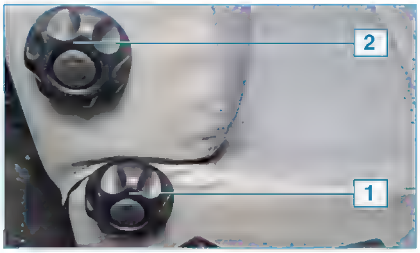
– average vehicle speed (km/h) since the last onboard computer reset. The value is shown on the display after the vehicle has traveled 400 m.

Adjustment of the f ront seats and steering column

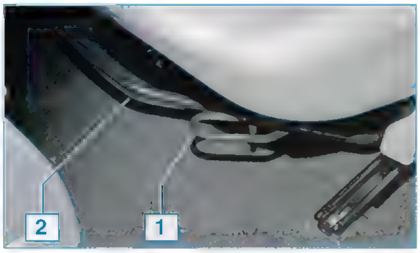
The front seats of the vehicle are equipped with adjustments that allow the driver and front passenger to set them to a comfortable position.

To move the driver’s seat forward or backward, lift lever 2 located under the front edge of the seat cushion and slide the seat in the desired direction.

To raise or lower the seat cushion, lift or lower lever 1.



Location of the adjustment handles on the- дительского сиденья: 1 — handle for adjusting the seatback angle; **2** — lumbar support adjustment handle



Location of the driver's seat adjustment levers: 1 — lever for adjusting the seat height; **2** — lever for adjusting the seat fore-aft- direction

The driver must not adjust the position of their seat while the vehicle is in motion. Doing so may lead to loss of control of the vehicle due to the seat suddenly moving forward or backward.

Additional comfort для driver provides the ability to adjust the steering column by tilt angle. The locking lever of the adjustment mechanism is located in the recess of the steering column cover.

To change the position of the steering wheel and steering column, lift the locking lever.

The steering column can be moved up and down. To lock it in a comfortable position, push the locking lever fully down.

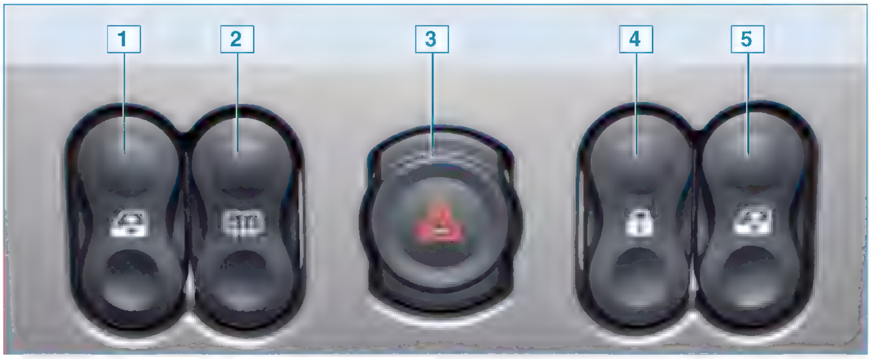
Do not begin driving with the steering column locking lever released, and do not adjust the steering column position while driving. This may result in loss of vehicle control.

Switches

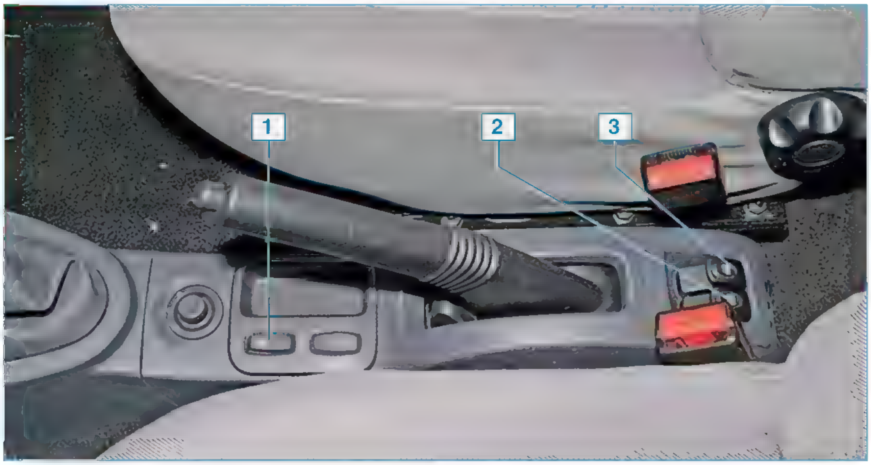
Front door power window switches. To lower the front door window with the ignition on (key in the ignition switch set to "M"), press and hold the lower part of the corresponding switch until the window reaches the desired position.

To raise the window fully or to a specific height, press and hold the upper part of the switch until the window reaches the desired position. Depending on the equipment, vehicles may be fitted with power windows that operate in pulse mode. In that case, with the engine running a brief press of the switch is enough to fully lower or raise the window. To stop the window at an intermediate position, press the switch again.

Rear window defroster switch. When the upper part of the switch button is pressed, the rear window heating element and the heated outside rearview mirrors with electric adjustment (depending on vehicle equipment) are activated, and at the same time the corresponding indicator lights up in the instrument cluster



Location of switches on the center console of the instrument panel: 1 – driver's door power window switch; **2** – rear window defroster switch; **3** – hazard warning switch; **4** – central door lock switch; **5** – front right door power window switch



Location of switches on the floor tunnel trim: 1 – rear window power window lock button; **2** – rear left door power window switch button; **3** – rear right door power window switch button

The rear window defroster can only be turned on while the engine is running. After 12 minutes of operation, the window and mirror heating switch off automatically and the indicator in the instrument cluster goes out.

Emergency warning light switch. To activate the emergency warning lights, press the switch button. All turn signal indicators and their indicator in the instrument cluster will begin to flash. The operation of the emergency warning lights does not depend on the position of the ignition key in the ignition switch or on the turn signal being on.

To deactivate the emergency warning lights, press the switch button again.

Central door lock switch. Pressing the upper part of the button locks all the doors. The front doors, the trunk lid, and the tailgate (Sandero, Sandero Stepway) can be opened with the key from the outside. When pressing the lower part of the button the locks of all the doors are unlocked.

Electric window switches rear door window regulators. To lower the rear door window, press and hold the corresponding switch button until the window reaches the desired position the desired position. To raise the window fully or to a specific height, press the switch and hold it until the window reaches the needed position.

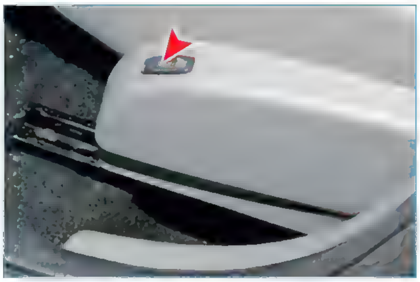
When using power windows, do not allow clothing or body parts to get caught in the gap between the window and the door frame.

Rear door power window lock switch. If children are seated in the rear, lock the power window controls to prevent unintentional lowering or raising of the windows. The rear power window lock switch is located on the floor tunnel trim closer to the driver.

While the lock button is pressed, rear door window regulator mechanisms changing the position of the glass of the doors is not possible.

You can unlock the power window mechanisms by pressing the lock button again.

Front seat heater switches of the front seats. The heating for each front seat is activated by pressing the button on the switch with the ignition on. To turn off the heater, press the button again.



Location of the front seat heater switch

When the parking lights are on, the symbols on the switch buttons are illuminated.

Heating, Ventilation and Air Conditioning Control Unit

The airflow intensity into the cabin is adjusted by turning the fan control knob (with the ignition on). This engages one of four fan speed settings.

Turning the control knob clockwise increases the fan speed.

The airflow distribution controller sets the following directions for the air flows in the cabin:

– toward the head area. irflow through the instrument panel vents goes to the upper part of the passenger compartment;

– toward the feet and head area. Airflow is directed through the upper vents of the passenger compartment and toward the footwell;

– to the footwell area. irflow is directed only to the footwell area;

– to the footwell area and toward the windshield and front door window vents. Airflow is directed to the footwell area and also to the windshield vent grilles and the front door windows;

– to the windshield and front door window vents. Airflow is directed only to the windshield and front door window vent grilles.

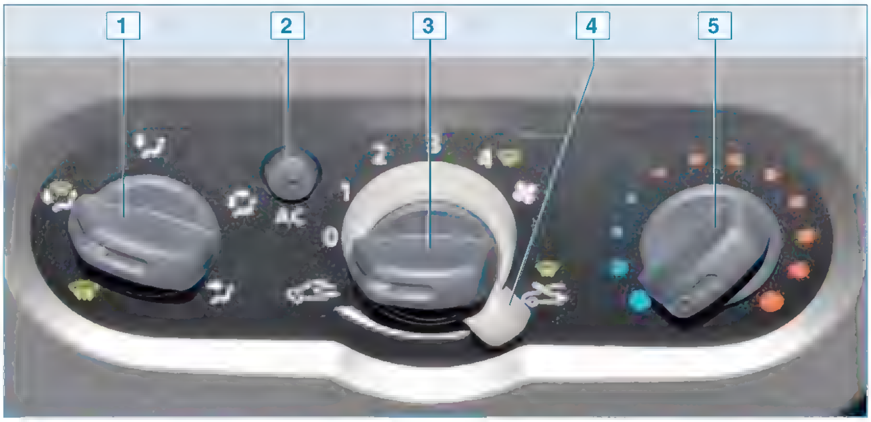
Turning the temperature control knob changes the temperature of the air entering the cabin.

To raise the air temperature, turn the control knob clockwise into the red sector of the scale; to lower the air temperature, turn it counterclockwise into the blue sector.

To allow outside air into the cabin, move the recirculation control lever to the extreme right position.

To activate the air recirculation mode, move the control lever to the extreme left position.

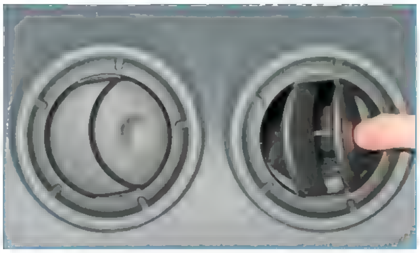
The air recirculation mode (stopping the supply of outside air to the cabin) is recommended when you need to quickly lower or raise the cabin temperature, or when driving in dusty conditions or in heavy traffic, to prevent dust or exhaust fumes from entering the cabin.



Heating, ventilation and air conditioning control unit: 1 – air flow distribution regulator; **2** – air conditioner switch; **3** – fan speed mode switch; **4** – air recirculation mode control lever; 5 – air temperature regulator

Use the recirculation mode with the door windows raised. It is not recommended to use the recirculation mode for extended periods, as this may increase the humidity inside the cabin and cause the windows to fog up.

Air can enter the cabin through the center or side vents of the heating, ventilation, and air-conditioning system. To allow air into the cabin...



...open the vent, by pressing its shutter.

To change the direction of the airflow...

...turn the deflector in the appropriate direction.

To prevent the windshield and door windows from fogging in warm weather, it is sufficient to direct cold air onto them. To do this, you should:

- – use the air distribution control to direct air through the upper vent grille for the windshield and the vent grilles for the front door windows;
- – move the air recirculation control lever to the far right position;
- – turn the temperature control knob to the blue sector;
- – switch the fan to the appropriate setting.

To remove ice and snow from the windows, direct heated air onto them by setting the temperature control lever to the red zone and selecting the required fan mode.

After the glass has defrosted, use the airflow distribution control to select the desired direction for supplying air into the cabin.

To speed up warming the cabin while the vehicle is stationary, it is recommended to turn on the recirculation mode; turn it off when driving.

USING THE AIR CONDITIONER

To turn on the air conditioner, press the switch button (see above) with the engine running. The indicator in the button will light. Press the button again to turn the air conditioner off.

On long climbs or in heavy urban traffic, running the air conditioner may cause the engine to overheat. Therefore, if the coolant temperature exceeds the permissible value, the air conditioner should be turned off.

If the vehicle has been parked in direct sunlight, open the windows and ventilate the cabin before turning on the air conditioner.

To prevent the windows from fogging in rainy weather, set the airflow distribution control to (with the heater switched off) and turn on the air conditioner.

If there is no need to run the air conditioner, it should still be switched on once every two weeks for a few minutes, even during winter operation at mildly below-freezing temperatures. This helps preserve lubrication on the compressor parts and seals, extending the service life of the air conditioning system.

When parked for a long time in the sun on a hot day, the air temperature inside the cabin becomes much higher than outside.

For quick cooling of the cabin, it is necessary to open the doors for a short time to let the hot air out. Then start the engine, turn the air conditioner to the maximum cooling setting, and close the doors. After getting into the cabin, the air conditioner should be switched to the most comfortable mode: it is recommended to maintain a difference between interior and exterior temperatures of 5–9 °C. The cooling airflow is best directed upward and never toward the face. This can cause colds and inflammation of the facial nerves.

The maximum cabin cooling mode is recommended for hot weather or after the vehicle has been parked in the sun for an extended period. This mode is achieved as follows.

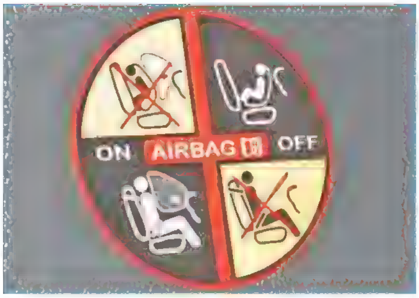
The air recirculation mode is on. The airflow distribution control is set to one of its positions; the temperature control is turned fully counterclockwise; the fan speed selector is set to "4"; and the air conditioner is switched on.

After a prolonged period of the car standing in hot weather in the sun, do not direct the air conditioner's cold airflow at the windshield when turning it on to avoid the formation of cracks.

Front Passenger Airbag Switch

The front passenger airbag switch is located on the right side of the instrument panel. To access the switch, you must open the right front door.

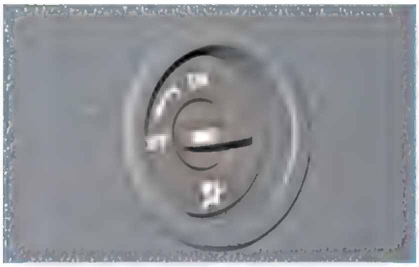
To prevent injury to a child when transporting them in a child seat installed on the front passenger seat facing the rear of the vehicle, you must deactivate the front passenger airbag.



There is a sticker above the airbag switch indicating in which cases the front passenger airbag must be deactivated

When the front passenger airbag is activated, the white marker on the switch handle is in the "ON" position

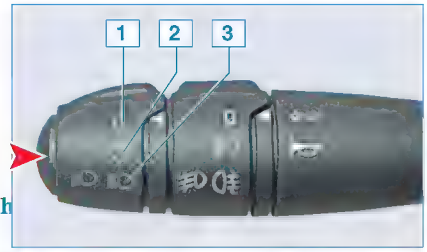
To deactivate the airbag, you must turn off the ignition...



...and, by depressing the switch handle, turn it counterclockwise to the "OFF" position.

The front passenger airbag is activated with the ignition off by turning the knob to the "ON" position.

After deactivating the air уш- When the ignition is turned on, the corresponding indicator in the instrument cluster should illuminate and remain lit to confirm that the airbag is deactivated.



Positions of the central lighting switch parking lights, license plate light, and illumination of the instrument cluster and controls; 3 – on: parking lights, license plate light, and illumination of the instrument cluster and controls plus the headlamps are lit (low or high beam, depending on the position of the headlight switch); the arrow indicates the horn button

If the front passenger airbag was deactivated or reactivated while the ignition was on, the airbag warning indicator will illuminate in the instrument cluster. To restore the airbag system to its normal state, switch the ignition off and then on again.

Steering column switches

Left steering-column switch

The left combined steering-column switch contains:

– parking/position lights switch;
– headlight switch;
– switch for fog lights фар;
– rear fog lamp switch;

– turn signal switch;
– horn switch.

To switch the exterior lighting instruments on or off (regardless of the key position in the ignition lock), turn the knob of the main lighting switch located at the end of the left steering-column stalk.

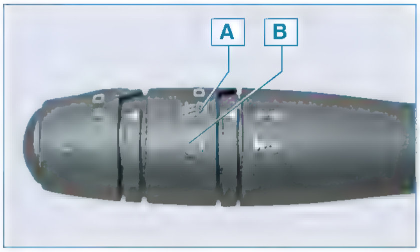
If the exterior lighting is on and the driver's door is open (regardless of the ignition key position), a warning audible signal will sound, reminding you to switch off the lighting.

To momentarily flash the high beams (regardless of the position of the main lighting switch knob and the ignition key), pull the steering-column stalk toward you. The stalk will return to its original position when released.

To keep the high beams on continuously, turn the main lighting switch knob to position “3” (see above) and pull the stalk toward you further than you would for a momentary flash. When the high beams are on, the corresponding indicator in the instrument cluster lights up in blue.

To switch the high beams back to low beams, pull the lever toward you once more.

To turn on the fog lights, switch on the parking lights by setting the knob at the end of the switch to position "2", then turn the second knob to position "A". When the fog lights are activated, the corresponding indicator lights up on the instrument cluster.



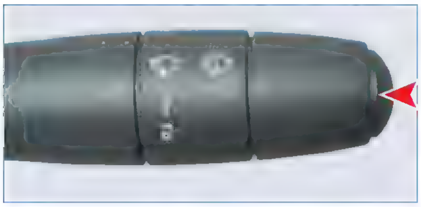
Positions of the left steering-column stalk levers when the front fog lights (A) and the rear fog lamp (B) are switched on

To turn on the rear fog light, switch on the parking lights by setting the knob at the end of the switch to position “2” and turn the second knob to position “B”; the front fog lights will also be illuminated.

When the rear fog light is switched on, the corresponding indicator lamp lights up in the instrument cluster.

To sound the horn
press the button on the end of the left steering-column stalk.
The turn signals are activated by moving the left combined steering-column stalk up or down to the stop (with the ignition on).

In the upper position of the lever the right turn signal is on; in the lower position, the left one.
When the steering wheel returns to the neutral position, the steering-column switch automatically returns to its original position and the turn signals turn off. To flash the turn signals briefly, move the lever up or down until they come on. After you release it, the lever automatically returns to the neutral position.



Right steering-column stalk switch (Logan car) (the arrow indicates the button that controls the display of data on the onboard computer screen)

Right steering-column switch

The right steering-column switch controls the windshield wiper and washer and is also responsible for displaying information on the onboard computer display.

The wiper and washer operate with the ignition on. To switch on the windshield wiper, move the right steering-column switch to one of the lower positions.

Windshield wiper operating modes from top to bottom:
– wiper off (default position);

– intermittent wiper operation mode;
– continuous wiper operation mode at low speed;
– continuous wiper operation mode at high speed.
To activate the windshield washer, pull the right stalk toward you and hold it; the windshield wipers will not activate automatically.

To operate the windshield wiper and washer simultaneously, pull the right stalk toward you and then down into one of the three wiper positions — this will activate both the washer and the wiper.

Right stalk switch (Sandero, Sandero Stepway)

On Sandero and Sandero Stepway models, to activate the tailgate washer, rotate the ring at the end of the lever until the washer symbol aligns with the arrow.

To turn on the trunk lid washer, rotate the ring to the next position until the washer symbol aligns with the arrow. To turn the washer off, release the ring and it will return to the position corresponding to the trunk lid glass wiper being on.

When operating the vehicle in winter, the wiper blades may freeze to the glass while parked. Turning the washer on at this time can damage its electric motor. Before switching on the washer, free any blades that have frozen to the glass.

Headlight beam direction adjuster

The vehicle is equipped with a mechanical cable-operated headlight beam direction adjuster.
The headlight beam direction adjuster is located on the instrument panel below, to the left of the steering column.
Aligning the indicator mark on the control knob with the numbers on the panel

Control knob

The instrument cluster provides the appropriate adjustment of the headlight beams for the following vehicle loading conditions:

0 – single driver or driver and front-seat passenger with an empty trunk;

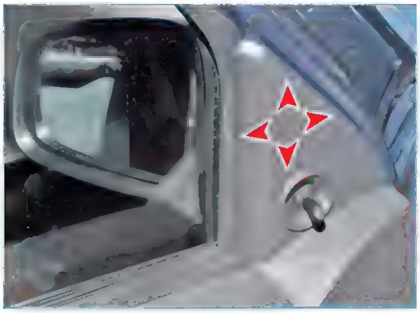
1 – driver and two or three passengers with an empty trunk;

2 – driver, three passengers and a loaded trunk;

3 – driver and a fully loaded trunk.

Rear-view mirrors

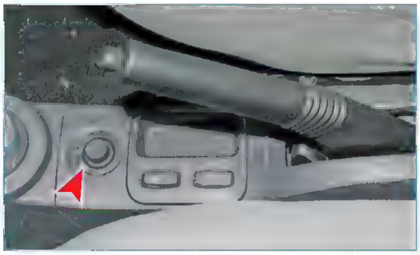
The vehicle is fitted with two exterior rear-view mirrors and one interior mirror.



The lever for manual mirror position adjustment is located on the inner side of the corresponding door.

The exterior mirrors are located on the front doors of the vehicle. They may be equipped with mechanical adjustment mechanisms or an electric drive.

By moving this lever up, down, forward, or backward, we adjust the position of the mirror's reflective element in the horizontal and vertical directions. The mirror control for vehicles equipped with electric drive is located on the floor tunnel trim.



Electric drive control for exterior rear-view mirrors

To adjust the left exterior rear-view mirror, turn the joystick control to the left; for the right mirror, turn it to the right. In the center position, the mirror electric drives are off.

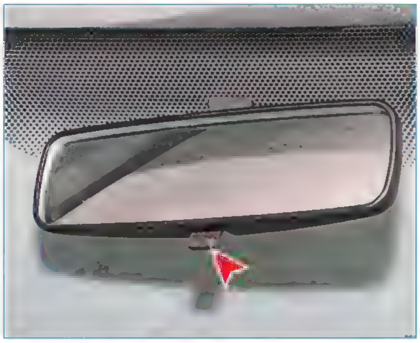
The mirror is adjusted by pressing the edges of the joystick.

The position of the interior rearview mirror can be adjusted in the horizontal and vertical planes by rotating the mirror housing on its hinge.

There are two modes for the interior mirror position: "day" and "night".

To reduce the dazzling effect of the headlights of vehicles behind, we switch the mirror to the "night" position.

To do this...



...move the mirror position control (shown by the arrow) toward you...

...in doing so the mirror's angle of reflection changes and the glare effect is reduced.

! **Do not place objects on the shelf behind the rear seat that could reduce the mirror's field of view.**

SAFETY PROCEDURES FOR MAINTENANCE AND REPAIR

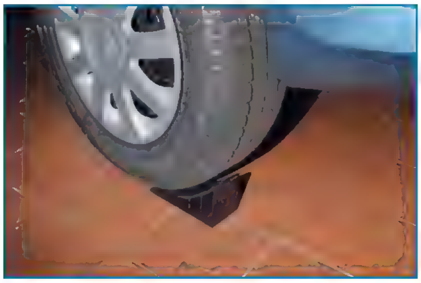
The room where repair work is carried out must be well ventilated, and the door must open easily both from the inside and the outside. Keep the path to the door clear at all times. A portable fire extinguisher and a first-aid kit must be present in the room.

When the engine is running (especially during starting), carbon monoxide is emitted — a poisonous gas without color or odor. A life-threatening concentration of carbon monoxide can form even with the garage doors open, so before starting the engine ensure exhaust gases are forcibly vented outside the garage. If there is no forced extraction, you may run the engine for a short time by fitting a section of hose onto the exhaust pipe and extending it outside the garage. The exhaust system and its connection to the hose must be airtight.

When servicing the power system, you must disconnect the cable terminal from the battery’s negative post and release the pressure in the system.

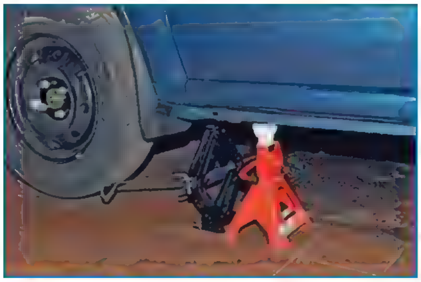
When using a cutoff wheel or grinding wheel, to avoid fire make sure there are no flammable materials in the spark scatter area. Also ensure that a battery placed on charge is not located in the spark scatter area to prevent explosion.

To protect your hands from cuts and bruises during “power” operations, wear gloves (preferably leather). To protect your eyes when using power tools, wear goggles (preferably ones with side shields). Do not use faulty tools: open-end wrenches with a spreading jaw or deformed mouths, screwdrivers with a rounded or twisted tip or improperly sharpened, pliers with poorly secured plastic handles, hammers with an unfastened handle, etc. When lifting a vehicle with a jack, engage the parking brake...



...and place chocks under the wheels.

Work should be carried out on level ground. When placing a jack under the sill, use only the points specified by the vehicle manufacturer. Use only a jack that is in good condition.



Do not work under the vehicle if it is supported only by a jack. For safety, use a factory-made support stand.

Beforehand, make sure the corresponding structural load-bearing elements of the body (floor reinforcements, sills) are sufficiently strong. Do not lift the vehicle on two or more jacks; use commercially manufactured support stands. Do not load or unload the vehicle while it is on a jack (do not get in, remove, or install the engine).

Used oils contain carcinogenic compounds. If oil gets on your hands, wipe them with a rag, then clean them with a special " hand-cleaning product" (or sunflower oil) and wash with warm water and soap.

Do not wash your hands with hot water, as harmful substances can more easily penetrate the skin.

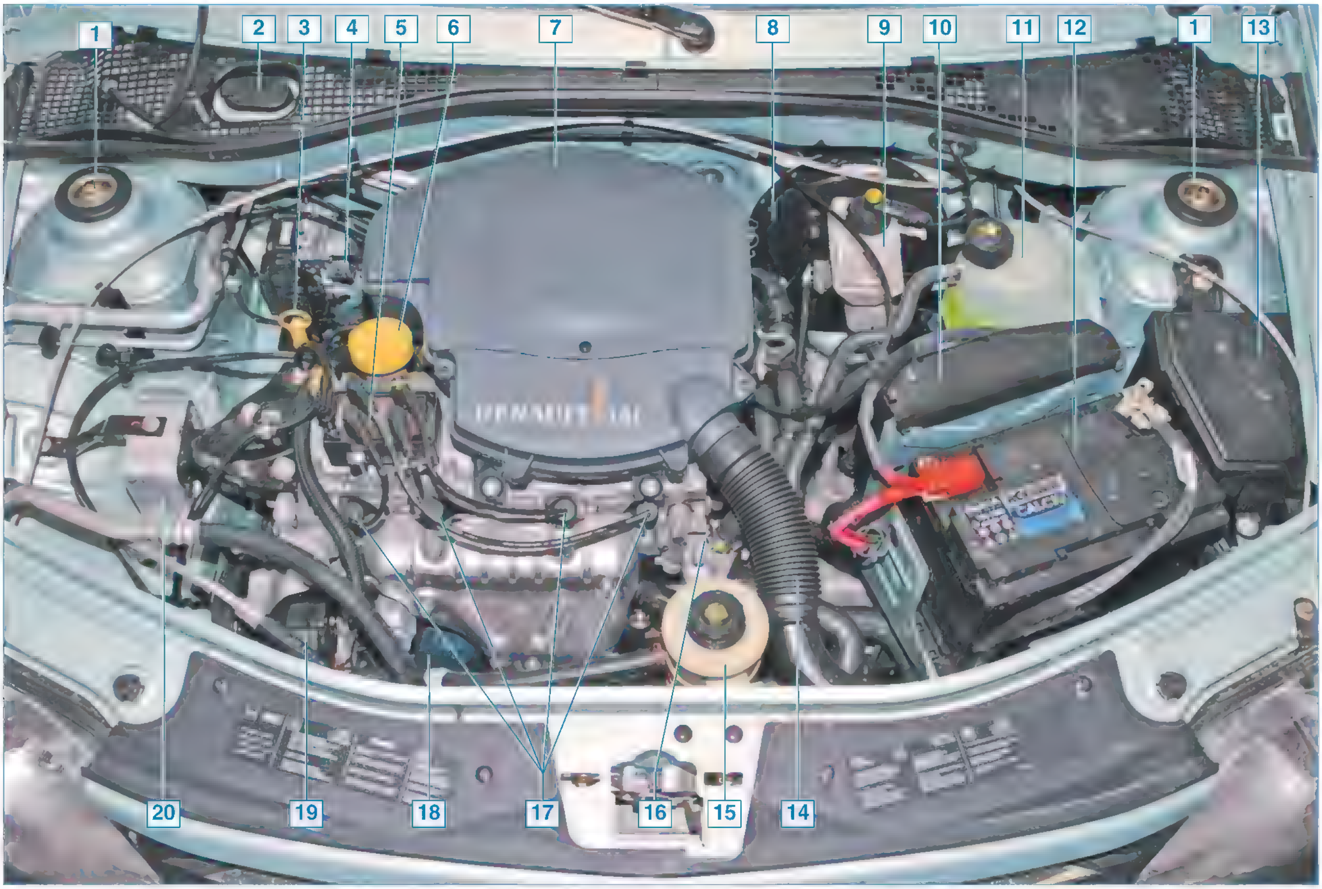
If gasoline gets on your hands, wipe them with a clean rag and then wash with soap. Engine cooling system fluid (antifreeze) contains ethylene glycol, which is poisonous if ingested and— to a lesser extent—if it contacts the skin. In case of antifreeze poisoning, induce vomiting immediately, rinse the stomach, and in severe cases take a saline laxative (for example, Glauber's salt) and seek medical attention. If it gets on the skin, rinse with plenty of water. The same applies to brake fluid poisoning.

Electrolyte causes burning and redness if it contacts the skin. If electrolyte gets on your hands or in your eyes, first rinse it off with a large amount of cold water. Then you can wash your hands with a solution of baking soda or ammonium hydroxide (household ammonia). Remember that sulfuric acid even in low concentrations destroys organic fibers—protect your clothing!

Place used materials in special containers for disposal. Gasoline, oils, brake fluid, rubber products, and plastics practically do not decompose naturally and require industrial recycling.

MAINTENANCE

Location of the vehicle's main units and assemblies



Location of units and assemblies in the engine compartment of a car with a 1.4–1.6 (8V) engine: 1 – upper mount of the shock absorber strut; **2** – windshield washer reservoir cap; **3** – engine oil level indicator (dipstick); **4** – ABS unit; **5** – ignition coil; **6** – oil filler cap; **7** – air filter; **8** – brake vacuum booster; **9** – brake fluid reservoir; **10** – engine electronic control unit (ECU); **11** – coolant expansion tank; **12** – battery; **13** – relay and fuse box; **14** – air intake hose; **15** – power steering fluid reservoir; **16** – engine; **17** – spark plugs; **18** – oil filter; **19** – power steering pump; **20** – right engine mount

Vehicle inspection

To ensure driving safety and extend the vehicle's service life, it is necessary to periodically perform external and internal inspections of the vehicle.

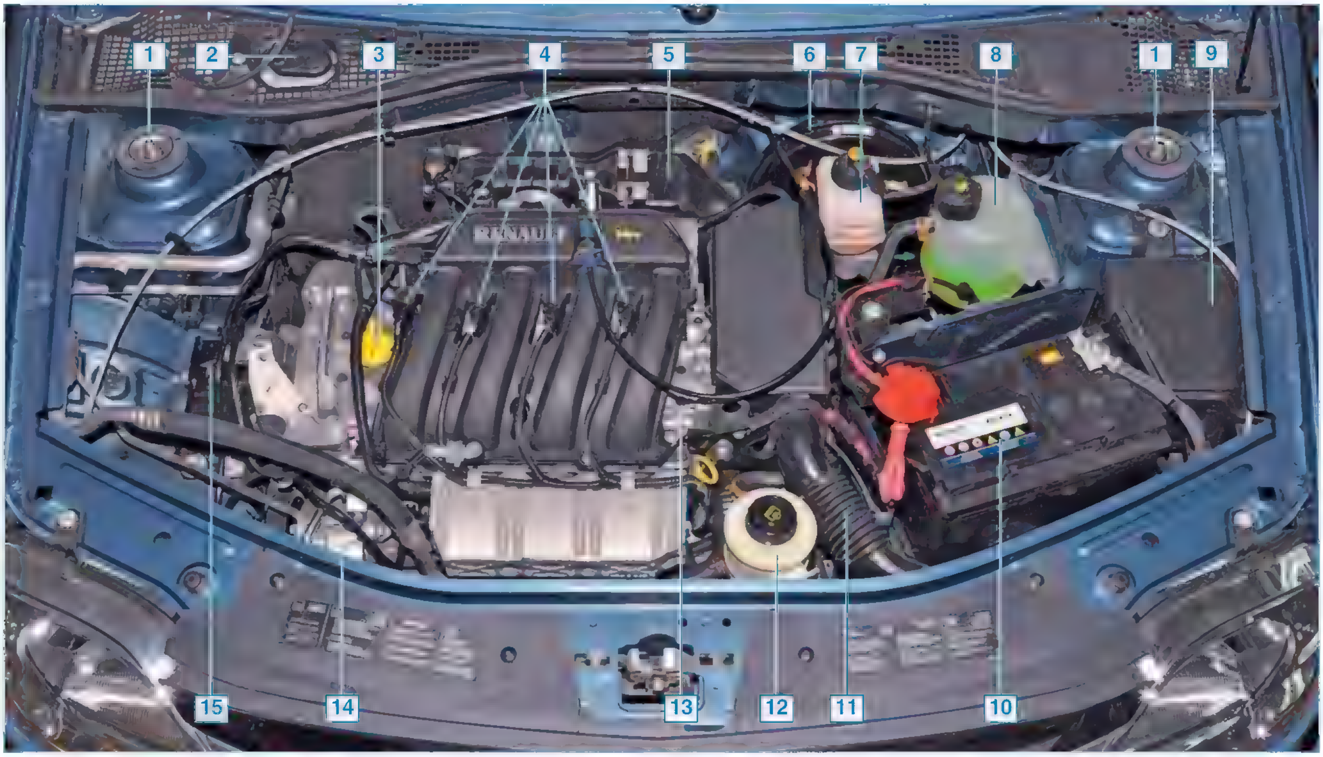
The duration of the inspection depends on how well you know your vehicle and how often you use it.

While using your vehicle you will learn the rates at which the engine and gearbox consume oil, the brake and coolant levels, and the reliability of various systems and instruments. This will allow you to plan your future actions and the time needed for vehicle checks. For example, if it turns out that the engine consumes oil relatively quickly (even if within normal limits), then you will need to monitor check the oil level in the engine oil pan more frequently. If after a month there is no visible change in the oil level, you can limit checks to once a month.

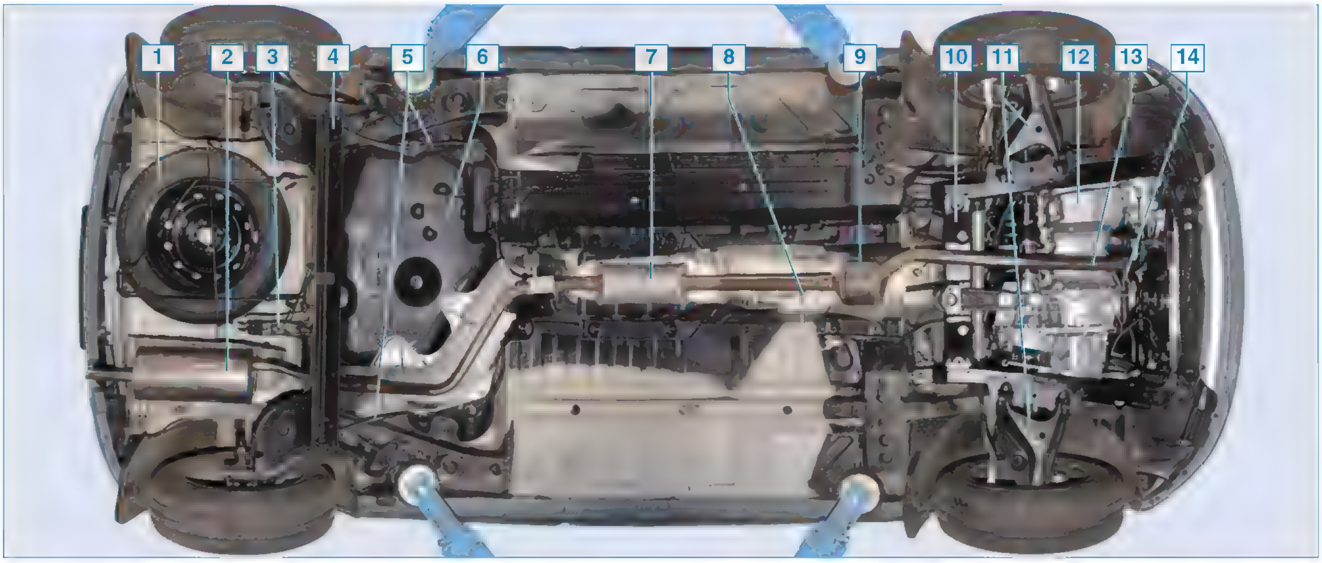
The more familiar the inspection actions become to you, the you will spend less time on them.

Outside the car check:

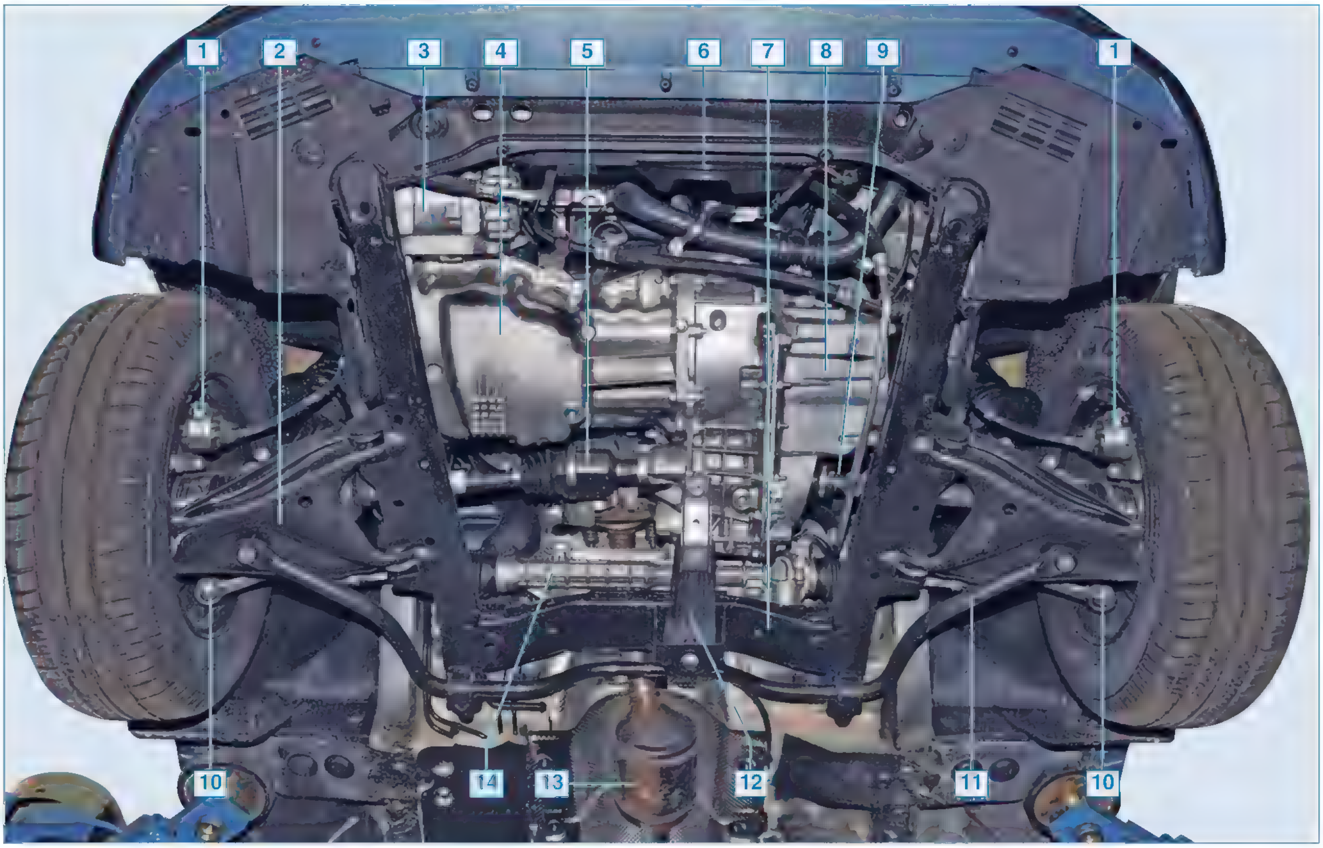
– tire air pressure and inspect them for damage;



Layout of components and units in the engine compartment of the car with 1.6 (16V) engine: 1 – upper mounting of the shock absorber strut; **2** – windshield washer reservoir cap; **3** – oil filler cap; **4** – ignition coils;**5** – air filter; **6** – brake vacuum booster; **7** – brake system fluid reservoir; **8** – engine coolant expansion tank; **9** – relay and fuse mounting block; **10** – battery; **11** – air intake hose; **12** – power steering fluid reservoir; **13** – engine; **14** – power steering pump; **15** – right engine mount



View from below of the Sandero (powertrain protection removed for clarity): 1 – spare wheel; **2** – main muffler of the exhaust system; **3** – brake pressure regulator for the rear-wheel hydraulic brake actuators; **4** – rear suspension beam; **5** – rear parking brake cable; **6** – fuel tank; **7** – auxiliary muffler of the exhaust system; **8** – oxygen concentration diagnostic sensor; **9** – catalytic converter; **10** – subframe; **11** – front suspension arm; **12** – power unit; **13** – exhaust system inlet pipe; **14** – oxygen concentration control sensor



View from below of the front section of the vehicle with the 1.6 (16V) engine (powertrain protection removed for clarity): 1 – front wheel brake assembly; **2** – front suspension control arm; **3** – air conditioning compressor; **4** – engine oil pan;**5** – right wheel drive shaft; **6** – radiator fan; **7** – subframe; **8** – transmission; **9** – left wheel drive shaft; **10** – steering tie-rod end; **11** – anti-roll bar link; **12** – rear engine mount; **13** – catalytic converter; **14** – steering gear housing

---

– tightening of wheel mounting bolts;

– proper operation of lighting and signaling devices. The check of the brake signals can be performed without an assistant by pressing the brake pedal and observing in the rearview mirror the reflection of the light in the rear-view mirror.

deposits from the wall, for example a garage;

– no signs of oil, coolant, fuel, or brake fluid leakage.

In the engine compartment we check:

– engine oil level;
– coolant reservoir level;

– brake hydraulic fluid level in the reservoir;
– the level of hydraulic fluid in the power steering reservoir;

of the statements;

– tension of the drive belt for auxiliary units;

– condition and fastening of the battery cable terminals.

– tension of the auxiliary drive belt;

– condition and fastening of the battery cable terminals.

In the vehicle cabin, check:

– the condition of the vacuum booster brakes;
– the operation of the clutch and gearbox linkages;

– the travel of the parking brake lever;

– the condition of the horn;
– proper operation of the windshield wiper and washer;

– proper operation of the gauges and instruments;

– fuel level in the tank;
– adjustment of the rearview mirrors;

– proper operation of the door lock locking mechanisms.

For Sandero and Sandero Stepway vehicles, check the operation of the washer and wiper for the luggage compartment door window.

Maintenance Regulations

Operation name	Mileage or operating time (whichever comes first)							
thousand km	15	30	45	60	75	90	105	120
годы	1	2	3	4	5	6	7	8
ENGINE AND ITS SYSTEMS								
Oil and oil filter replacement	+	+	+	+	+	+	+	+
Timing belt replacement	–	–	–	+	–	–	–	+
Accessory drive belt replacement	–	–	–	+	–	–	–	+
Replacement of the air filter element	+	+	+	+	+	+	+	+
Spark plug replacement	–	+	–	+	–	+	–	+
Coolant replacement *	–	–	–	–	–	+	–	–
Diagnostic check of the engine control unit by computer	+	+	+	+	+	+	+	+
Check for leaks in the cooling, fuel, and exhaust systems of exhaust gases, as well as the condition of hoses, pipelines, and their connections	+	+	+	+	+	+	+	+
TRANSMISSION								
Check clutch actuation	+	+	+	+	+	+	+	+
Check condition of protective boots on drive joint shafts front wheels	+	+	+	+	+	+	+	+
CHASSIS								
Inspect tire condition and tire pressure	+	+	+	+	+	+	+	+
Inspect condition of stabilizer bushings and mounts lateral stability, suspension control arm silent blocks	+	+	+	+	+	+	+	+
Inspect condition of ball joints	+	+	+	+	+	+	+	+
Check condition of front and rear shock absorbers	+	+	+	+	+	+	+	+
STEERING CONTROL								
Check fluid level in the power steering reservoir steering	+	+	+	+	+	+	+	+
Check for leaks in the power steering system steering	+	+	+	+	+	+	+	+
Inspection of the condition of the steering gear boots and tie rod ends steering rods	+	+	+	+	+	+	+	+
BRAKE SYSTEM								
Check the brake fluid level in the reservoir and for leaks of the hydraulic drive, and the condition of hoses and pipes	+	+	+	+	+	+	+	+
Inspection of the condition of brake pads and discs front wheels	+	+	+	+	+	+	+	+
Inspection of condition and dust cleaning of brake pads rear wheel mechanisms	–	–	–	+	–	–	–	+
Brake fluid replacement*	–	–	–	–	–	+	–	–
ELECTRICAL EQUIPMENT								
Battery check with tester	+	+	+	+	+	+	+	+
Check of exterior and interior lighting lamps	+	+	+	+	+	+	+	+
Check of warning indicators in the instrument cluster	+	+	+	+	+	+	+	+
BODY								
Check condition of the windshield and rearview mirrors	+	+	+	+	+	+	+	+
Check condition of the windshield wiper blades	+	+	+	+	+	+	+	+
Check of anticorrosion coating	+	+	+	+	+	+	+	+
VENTILATION, HEATING, AND AIR CONDITIONING SYSTEM								
Air conditioning system cleaning	After 2 years							
Check and recharge refrigerant	After 4 years							

* Or after three years, whichever comes first.

When the vehicle's mileage exceeds 120,000 km, the maintenance operations specified in the maintenance schedule should be carried out at the intervals indicated in the table. During vehicle operation, its technical condition changes due to wear of working surfaces of parts, deviations in adjustment parameters, and aging of plastic and rubber components. To keep the vehicle in working condition, it may be necessary to perform some of the described operations more frequently. If the vehicle is operated in highly dusty conditions, at low ambient temperatures, used to tow a trailer, on frequent low-speed trips, or for short distances, maintenance should be performed more often (see the vehicle Service Booklet).

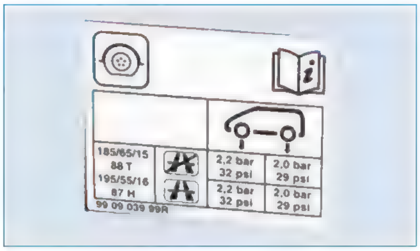
Inspection of wheels and tires

For driving safety and to extend tire life, visually inspect the tires before driving, maintain the required pressure, and check it regularly (at least once a month) and bring it up to the correct level.

The recommended tire air pressures are indicated on the plate,

affixed to the edge of the left front doors. The plate shows the recommended air pressure values for the front and rear tires when driving off the motorway and on the motorway.

Signboard of the Logan and Sandero.



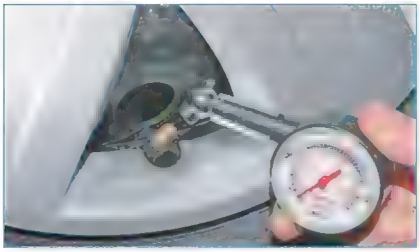
Vehicle plate of the car Sandero Stepway.

You should also check the tire pressure when the ambient temperature drops or rises significantly, and before undertaking a long-distance trip.

During prolonged driving, especially at high speed, the tires heat up and the pressure in them increases. Therefore, tire pressure should be checked when the tires are cold before driving.

If it is not possible to measure the pressure when the tires are cold, you must take into account the increase in tire air pressure due to heating while driving.

0.2–0.3 bar.
Unscrew the cap from the wheel valve...



...and attach a tyre gauge or a pump with a gauge. If the pressure is below the required level, use a tyre pump or compressor to inflate the tyre, monitoring the pressure with the gauge.

If the pressure is higher than required...

...by pressing the gauge's special protrusion (or a suitable tool using the stem) to the valve spindle, release the air from the tire in small bursts and check the pressure.

When operating the vehicle with a full load and a trailer, the tire air pressure should be increased by 0.2 bar.

Tires must not have bulges, tread separations, or damage that exposes the cord. The remaining tread depth must be at least 1.6 mm.

The degree of tire wear can be determined...

...by measuring the remaining tread depth with a depth gauge caliper

It is prohibited to install tires of different models on the same axle, as well as tires whose size does not conform to the technical requirements of the vehicle manufacturer.

The manufacturer does not recommend rotating the wheels. When the front tire treads reach their limit of wear (front tires wear out about twice as fast as the rear ones), we recommend purchasing one tire of the same model and fit it to the front axle together with the spare (unworn) tire. We recommend placing the least worn of the replaced wheels in the spare wheel position.

Regularly check the tightening of the wheel mounting bolts and retighten the bolts if necessary.
If vibrations occur while driving on a flat road within a limited speed range, have the wheels balanced at a tire service. Vibration at all speeds may be caused by a flat spot—

with heavy tire wear, the appearance of

if it is bulging or has other damage, or if the wheel rim is deformed. Replace damaged tires or rims.

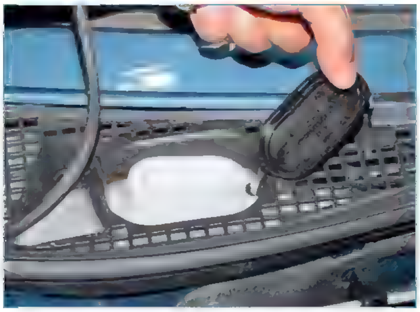
Wheel rims should be kept clean to prevent corrosion spots. Areas with damaged coating can be sanded with sandpaper, degreased, primed, and painted.

Checking the windshield washer fluid reservoir level

You should periodically check the fluid level in the windshield washer reservoir and the rear hatch window washer reservoir and top up the fluid if necessary.

At ambient temperatures +2 °C and below, you should fill the reservoir only with specially formulated windshield washer fluid or a concentrate diluted with water in the required proportions. Water or heavily diluted washer fluid can freeze in the reservoir, lines, or washer nozzles. Plain water is acceptable for use only during warm weather.

The windshield washer reservoir is located in the engine compartment on the right side, under the windshield trim.



Open the filler neck cap
of the reservoir.

Through the filler neck, visually check the fluid level. If necessary...

...add fluid to the reservoir. Close the windshield washer reservoir cap.

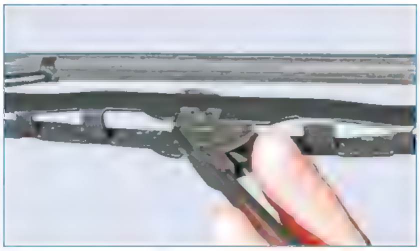
Wiper Blade Replacement of the windshield and the rear hatch glass

Replace the wiper blades when cleaning performance deteriorates, approximately once a year—preferably before the start of the autumn–winter season. The length of both windshield wiper blades is 510 mm; the length of the tailgate wiper blade is 410 mm. Blades should be rinsed periodically under warm running water with soap. If blades are heavily soiled or iced over, they should be removed and cleaned.

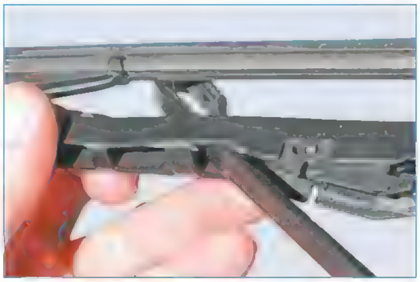
To do this, move the arm with the wiper away from the glass.

Be careful when removing the wipers: the spring-loaded arm can suddenly snap down onto the glass and crack it.

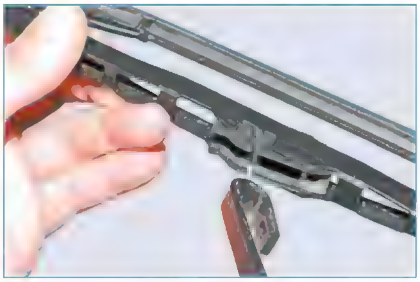
To replace the windshield wiper blade...



...press the wiper latch tab...

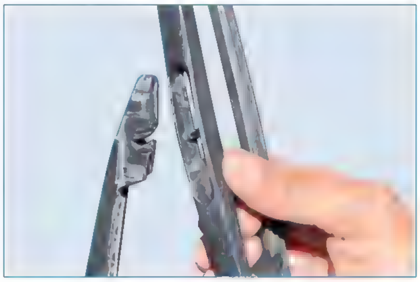


...and slide the wiper toward the base of the arm so that the wiper lock disengages from the arm hook.



Remove the wiper from the arm. Remove the other wiper in the same way. Install the windshield wipers in the reverse order.

To replace the rear hatch window wiper blade...

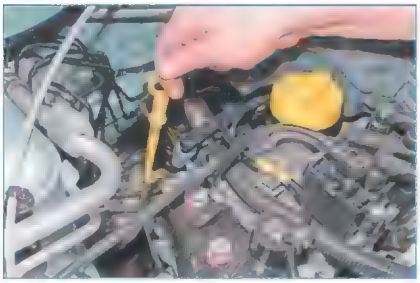


...remove the wiper from the arm. Install the wiper in reverse order.

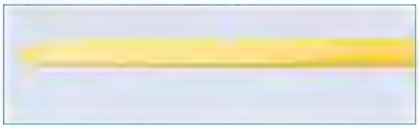
Checking the engine oil level 1.4–1.6 (8V)

Check the oil level in the sump with the engine switched off and the vehicle on a level surface. If the engine was running before the check, stop it.

Wait at least three minutes (the oil must have time to drain into the oil pan of the engine)...

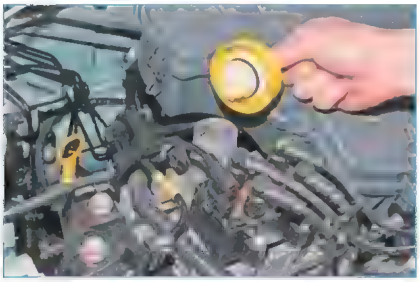


...and pull out the oil level indicator (dipstick).
Wipe the indicator with a clean rag and insert it fully into the guide tube. Pull the indicator out again and determine the oil level in the engine oil pan by the edge of the oil film on it.



The edge of the oil film should lie between the two recesses on the indicator (MIN and MAX marks).
Operating the vehicle with the oil level below the MIN mark may cause engine damage and, consequently, expensive repairs.

If the oil level is below the MIN mark...



...turn the cap of the oil filler neck counterclockwise and remove it.
Through the filler neck, add oil to the engine in small portions. The difference in oil volume between the MIN and MAX marks is about 1.5 L.

You should top up with the same brand of oil that was originally poured into the engine.

Wait at least three minutes to allow the added oil to drain into the sump, then check the level again. Reinstall the dipstick.

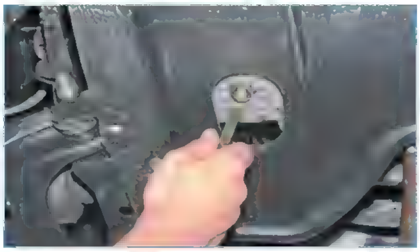
When adding oil, do not allow the level to rise above the MAX mark. Otherwise, oil can enter the combustion chambers through the crankcase ventilation system, and burnt oil products may damage the catalytic converter.

Engine oil and oil filter replacement 1.4 engine −1,6 (8 V)

Change the engine oil in accordance with the maintenance schedule. Perform the work over an inspection pit or on a ramp. Conduct the oil change with the engine switched off and warmed up — preferably immediately after driving, while the oil is still warm.

Use the oils recommended by the manufacturer (see “ Appendices,” p. 315).

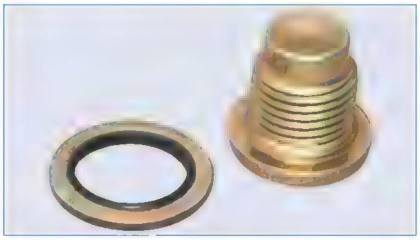
Remove the oil filler cap. From beneath the vehicle, clean the oil pan around the drain plug of any dirt.



Use a 8 mm square drive to loosen the drain plug.

Place a wide container with a capacity of at least 4 liters under the drain to catch the used oil, then unscrew the plug by hand and drain the oil.

Be careful — the oil is hot.



To prevent oil leakage from beneath the crankcase sump along the surface of the washer opening, a thin layer of rubber was vulcanized.

A steel washer is fitted under the plug.
Inspect the washer. If the rubber seal of the washer is damaged, replace the washer with a new one. If a new standard washer is not available, you can install a copper washer with an 18 mm hole under the plug. Drain the oil for at least ten minutes. Screw in and tighten the drain plug. Remove oil drips from the engine oil pan and the powertrain protection. When changing the oil, you must replace the oil filter. Place a container under the oil filter. Unscrew the oil filter (counterclockwise). If you cannot do this by hand...

...loosen the filter by using a filter wrench.
If a wrench is not available, punch the filter housing with a sturdy screwdriver (near the bottom so as not to damage the engine fitting) and unscrew the filter using the screwdriver as a lever. Clean the filter mounting surface on the engine block from dirt and oil drips. Pour new oil into the filter

Fill the motor oil to about half its volume and apply motor oil to the filter's sealing ring. Screw the oil filter on by hand until the sealing ring contacts the engine block. Tighten the filter an additional 2/3 of a turn to seal the connection. Through the oil filler neck, pour 3.3 L of motor oil into the engine. Close the oil filler cap.

Start the engine for 1–2 minutes. Make sure the low (warning) oil pressure indicator in the instrument cluster goes out and that there are no leaks from the drain plug or the filter.

Stop the engine. After a few minutes (to allow the oil to drain into the oil pan), check the oil level and bring it up to the correct mark. If necessary, retighten the oil filter and the drain plug.

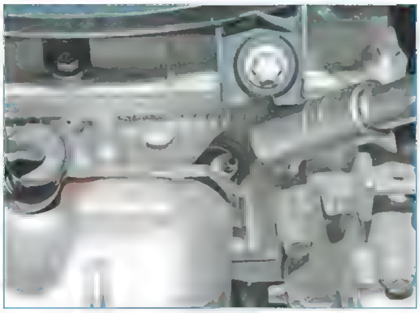
Spark plug replacement engine ignition 1.4–1.6 (8V)

The manufacturer recommends using EYQUEM RFC58LZ2E or SAGEM RFN58LZ spark plugs on K7J and K7M engines, as well as CHAMPION RC87YCL.

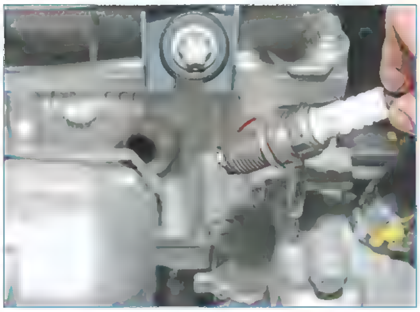
In accordance with the maintenance schedule, spark plugs are replaced every 30,000 km. The work is carried out on a cold engine.

Remove the high-voltage wire boot from the spark plug.

Before unscrewing the plug, remove dirt from the well around the spark plug — it's best to blow out the well with compressed air.



Use a spark plug wrench or a 16 mm deep socket with an extension to unscrew...



...and remove the spark plug.

When installing a spark plug, it must be started and threaded in by turning the spark plug wrench or extension by hand, without a ratchet, to avoid damaging the thread in the spark plug hole in the cylinder head.

If the plug is cross-threading, you will feel a strong resistance to rotation.

In that case, you must completely remove the plug and, after cleaning the threads, reinstall it. Finally, tighten the plug to the required torque.

! **Overtightening the spark plug can lead to damage to the thread in the spark plug hole of the cylinder head.**

Similarly, replace the remaining spark plugs. Install only the spark plugs recommended by the manufacturer or equivalent parts from other brands.

Replacement of the engine air filter element 1.4–1.6 (8V)

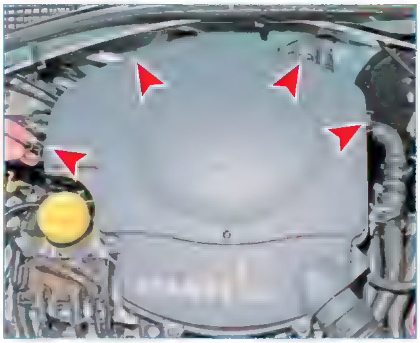
The replaceable element of the air filter must be changed every 15,000 km of driving.

When operating the vehicle in dusty conditions, the interval between element replacements should be reduced by 1.5–2 times.

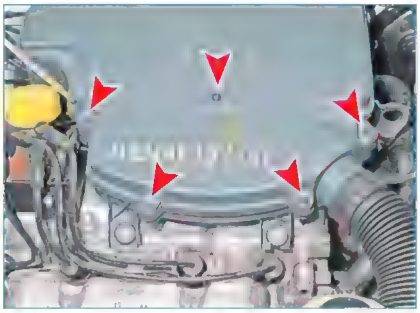
A deformed or damaged element must be replaced regardless of mileage.

! **A damaged or heavily soiled air filter element can cause excessive wear and reduced engine power.**

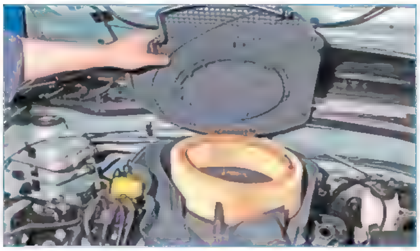
To remove the replacement element...



...unclip the four spring latches.



Using a Phillips screwdriver, loosen the five self-tapping screws securing the air filter cover. The screws are not removed from the cover.



Removing the cover...

...and carefully, so as not to drop dirt into the throttle housing inlet, we remove the replaceable element from the filter housing.

After cleaning the filter housing cavity of contaminants, we install the new replaceable element and the air filter cover.

Replacement of the auxiliary drive belt for 1.4–1.6 (8V) engines

According to the maintenance schedule, the auxiliary drive belt should be replaced every 60,000 km or every 4 years (whichever comes first), regardless of its condition. The work is performed on an inspection pit or ramp.

We recommend checking the condition of the belt at every scheduled maintenance.

The belt must be replaced if any cracks, tears, or separation of the rubber from the fabric backing are found.

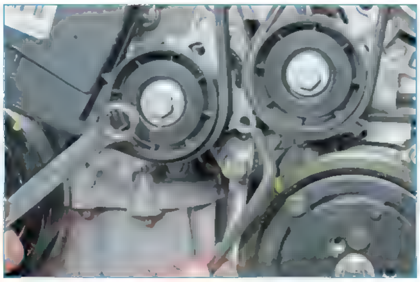
Depending on the vehicle's equipment, there are three possible auxiliary drive layouts.

Option 1.

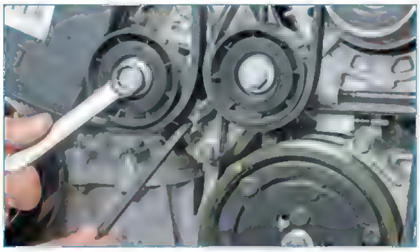
The belt tension on vehicles with power steering and air conditioning is adjusted automatically by a tensioner. To replace the belt, remove

Remove the right mudguard of the engine compartment (see “Removing the engine compartment mudguards,” p. 283).

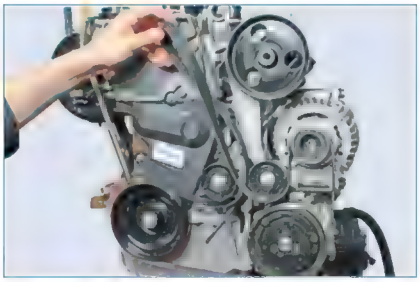
To relieve belt tension from beneath the vehicle...



...fit a 13 mm open-end or box wrench onto the tensioner pulley bolt and turn the pulley bracket clockwise, overcoming the spring force of the tensioner, until the hole in the pulley bracket aligns with the recess in the tensioner housing (shown for clarity on a removed engine).



Secure the roller bracket by inserting a 6 mm hex key or a 6 mm diameter rod into its hole and the recess in the tensioner body.



Removing the auxiliary drive belt.

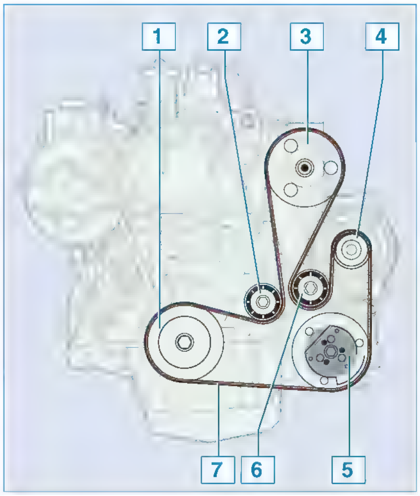
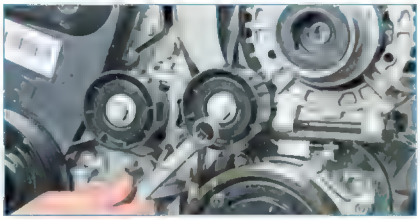


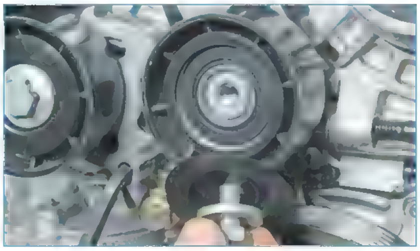
Diagram of the auxiliary drive of a vehicle with power steering and air conditioning: 1 – auxiliary drive pulley; **2** – tensioner pulley; **3** – power steering pump pulley; **4** – alternator pulley; **5** – air conditioning compressor pulley; **6** – idler pulley; **7** – belt

Marking of the auxiliary drive belt for a vehicle with power steering and air conditioning — 5K 1747 (five-rib,

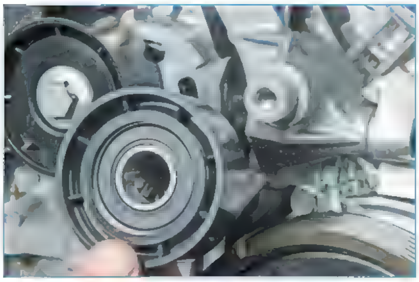
length 1747 mm). When replacing the belt, you must also replace the support and tension rollers. To replace the support roller …



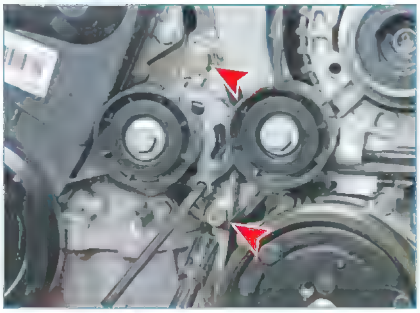
...use a box wrench or a 13 mm socket to loosen the bolt securing it...



...and remove the bolt with the roller's protective cover.

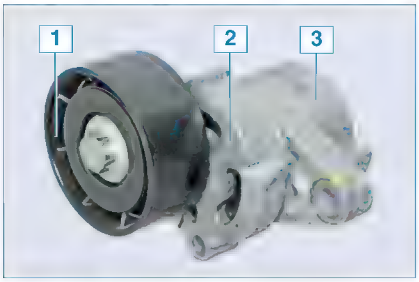


Remove the idler pulley.
Similarly, remove the tension pulley.
If the tensioning assembly needs to be replaced (for example, if the spring breaks)...



...use a 13 mm socket to loosen the two bolts securing the tensioner housing...
...and remove the tensioner assembly together with the pulley. Reinstall the removed parts in reverse order. Before fitting the belt, the tensioner pulley bracket must be rotated clockwise and secured (see above).

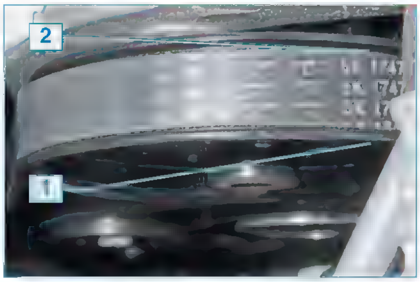
When fitting the belt, lay it over the pulleys and route it under the tensioner and idler rollers according to the drive diagram.



Automatic tensioning assembly, complete: 1 – tensioner pulley; **2** – pulley bracket; **3** – housing

The pulleys for the auxiliary drive units—the alternator, air-conditioning compressor, and power steering pump—are six-groove, while the drive belt is five-groove.

Place the belt on the pulleys like this...

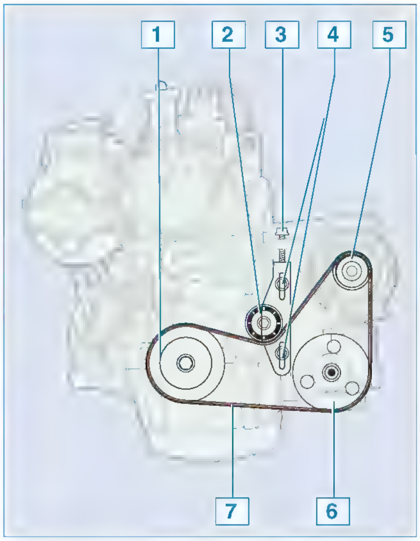


...so that it is shifted toward their outer edge 1, while the pulleys' inner groove 2 remains free.
After fitting the belt, slightly turn the tensioner with a wrench and remove the retainer. Then use a 18 mm socket with a ratchet to rotate the crankshaft clockwise three turns by the pulley mounting bolt of its pulley to achieve the correct belt position.

Option 2.

The manufacturer recommends that checking the drivebelt tension of auxiliary units on a vehicle with power steering and without air conditioning be carried out at an authorized RENAULT dealer using a special tool (a tensiometric tester). Considering that the belt may need to be replaced on the road (for example, if it breaks), we will show a method by which you can estimate the belt tension approximately.

Remove the right mudshield of the engine compartment (see “Removing the engine compartment mudshields”, p. 283). From beneath the vehicle, press the belt midway between the pulleys of the power steering pump and the crankshaft with the pad of your thumb. With a pressing force of ~10 kgf, the belt deflection should be 6–8 mm. To tension the belt, loosen the two bolts 4 securing the tensioner bracket



Drive diagram for the vehicle's auxiliary units with power steering, without air conditioning: 1 – auxiliary drive pulley; **2** – tensioner pulley with bracket; **3** – adjustment bolt;**4** – bolt securing the tensioner pulley bracket; **5** – alternator pulley;**6** – power steering pump pulley; **7** – belt

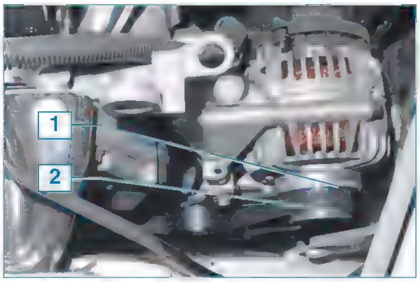
and turn the adjustment bolt 3 clockwise. After tensioning the belt, tighten the tensioner mounting bolts.

Excessive belt tension leads to premature failure of the belt and the tensioner pulley, as well as to damage to the bearings of the auxiliary units.

To replace the belt, turn the adjustment bolt 3 counterclockwise several turns and loosen the fastening bolts 4 of the tensioner bracket. With the belt tension relieved, remove it from the pulleys. The designation of the accessory drive belt for a vehicle with power steering and without air conditioning is 5K 1110 (five-rib, length 1110 mm). When replacing the belt, the tensioner pulley must also be replaced. Install the drive belt of auxiliary units in reverse order.

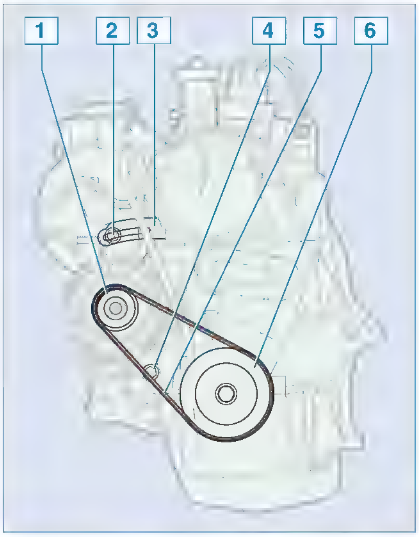
Drive pulleys of the auxiliary units, the alternator and the power steering pump are six-groove, and the drive belt is five-groove.

We lay the belt onto the pulleys like this...



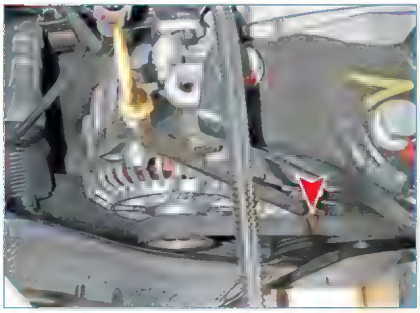
...so that it is offset toward the inner edge of the 1 pulleys, while the outer groove of the 2 pulleys remains free. Adjust the belt tension (see above). For a precise check of the belt tension, contact a service center.

Option 3.



Generator drive diagram for a vehicle without power steering and without air conditioning: **1** – generator pulley; **2** – bolt securing the generator to the tensioning bracket; **3** – tensioning bracket; **4** – lower generator mounting bolt; **5** – generator drive belt; **6** – auxiliary drive pulley

To check the drive belt tension on a vehicle without power steering and without air conditioning, press the belt with your thumb...



...in the middle between the alternator pulley and the crankshaft.

When applying a pressing force of ~10 kgf, the belt deflection should be 6–8 mm. To tension the belt, remove the right splash shield of the engine compartment (see “ Removing the engine compartment splash shields,” p. 283).

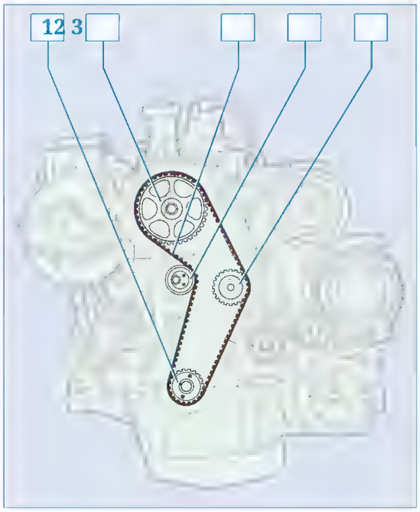
Loosen the bolt 4 of the alternator's lower mounting and bolt 2 that secures the alternator to the tensioning plate. Using a pry bar to move the alternator away from the engine block, tension the belt. Tighten the alternator mounting bolts.

Do not overtighten the belt! Excessive belt tension causes premature failure of both the belt itself and the alternator bearings.

When replacing the belt, loosen its tension (see above) and remove the belt from the crankshaft and alternator pulleys. The alternator drive belt designation on a vehicle without power steering and without air conditioning is 4PK 718 (four-rib, 718 mm long). Install the alternator drive belt in the reverse order and adjust its tension. For an accurate belt-tension check, please contact a service center.

Checking condition and replacing the timing belt for 1.4–1.6 (8V) engines

Failure of the timing drive belt (tooth breakage or shearing) will cause the valves to strike the pistons due to misalignment of the crankshaft and camshaft rotation angles and, consequently, result in costly engine repairs. Therefore, according to the vehicle maintenance schedule, replace the belt every 60,000 km or every 4 years (whichever comes first), regardless of its condition. At each service, we recommend inspecting the belt. The toothed surface of the belt must not have folds, cracks, tooth edge cuts, or fabric delamination from the rubber. The back side of the belt must not show wear that exposes the cord fibers or signs of burning.

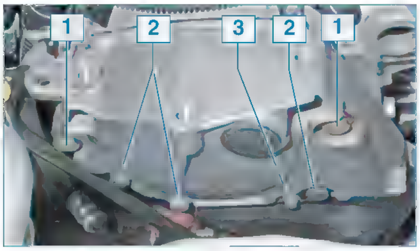


Timing drive diagram: 1 – toothed crankshaft pulley; **2** – toothed camshaft pulley; **3** – timing belt; **4** – tensioner pulley; **5** – toothed coolant pump pulley

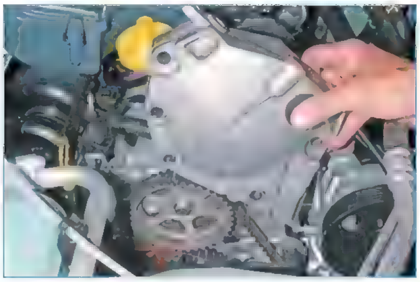
There must be no delamination or fraying on the belt's end faces. The belt should be replaced if any oil traces are found on it.

To assess the condition of the timing belt and replace it, remove the right engine mount (see “Replacing the engine mounts”, p. 96) and the right splash shield of the engine compartment (see “Removing the engine compartment splash shields”, p. 283).

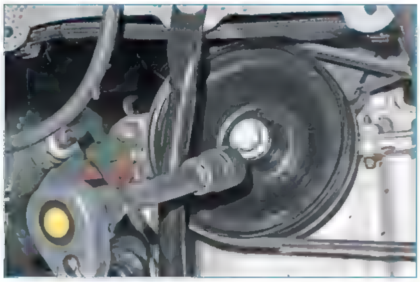
Unscrew the six bolts securing the upper timing belt cover...



...with a 16 mm socket — two bolts 1, with a 13 mm socket — three bolts 2, and with an 8 mm socket — bolt 3.

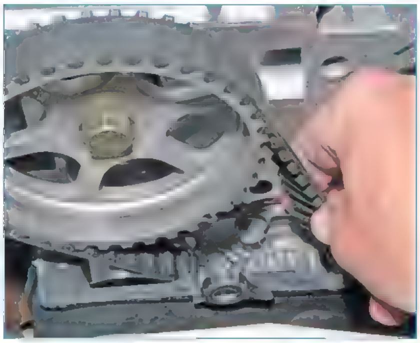


Remove the upper timing belt cover.



Using an 18 mm socket with a ratchet, turn the crankshaft clockwise by the bolt securing the accessory drive pulley and visually inspect the condition of the belt.

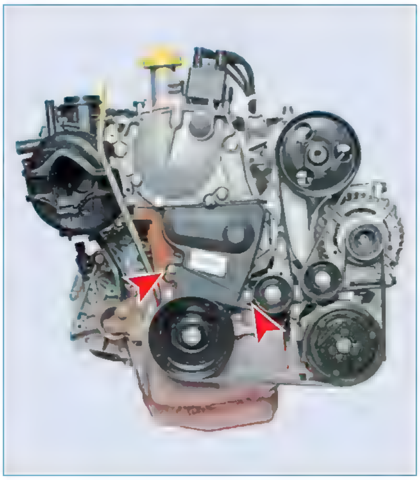
The manufacturer recommends checking and adjusting the timing belt tension with a special tool — a tensiometric tester. Without the tool, you can only estimate the belt tension roughly.



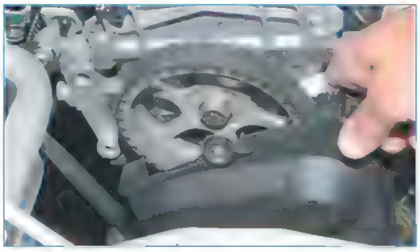
If you can, with the strength of your thumb and index finger, bend the drive side of the belt (at the point located between the timing belt toothed pulleys on the camshaft and the coolant pump) by more than 60°–70°...

...then the belt is too loose and needs to be tightened.

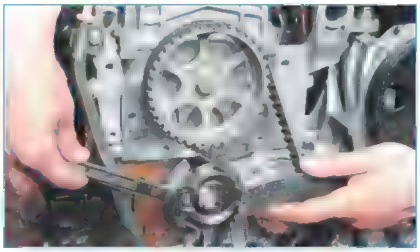
To adjust the belt tension, remove the lower cover. Using an 8 mm socket with a ratchet, unscrew the two bolts securing the lower timing belt cover.



Bolts securing the lower cover of the timing belt drive (shown on the removed engine for clarity)



Remove the lower timing belt cover.



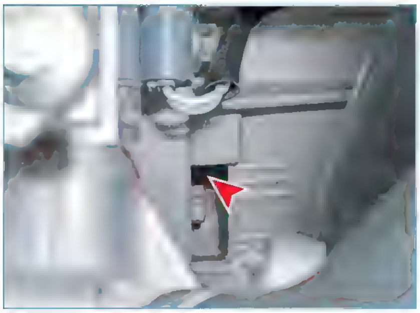
Loosening the nut securing the tensioner with a 16 mm wrench, use a special wrench (the same wrench used for tensioning the timing belt on front-wheel-drive VAZ cars) to turn the pulley counterclockwise to tighten the belt.

With the tensioner in this position, tighten its mounting nut. Turn the crankshaft clockwise by two revolutions using the bolt on its pulley, then recheck the belt tension and repeat the adjustment if necessary. Reinstall the removed parts in reverse order.

To replace the timing belt, remove the accessory drive belt (see “Replacing the accessory drive belt for 1.4–1.6 (8V) engines,” p. 32) and the upper and lower timing belt covers (see above).

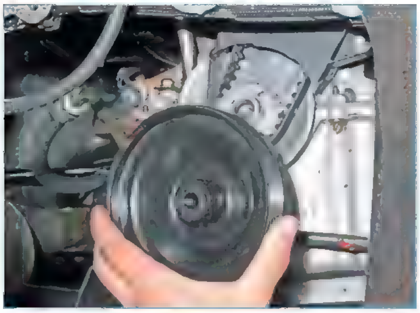
When loosening the crankshaft pulley retaining bolt, it is necessary to lock the shaft to prevent rotation. You can use the inspection window in the clutch housing located above under the thermostat housing. With an assistant turning the crankshaft, watch the movement of the clutch cover through the window. Ensure that one of the six bolts securing the cover to the flywheel appears in the window.

Lock the crankshaft from turning by inserting the blade of a power slotted screwdriver...



...between the top wall of the clutch housing window and the head of the cover mounting bolt. Be careful when performing this operation so as not to damage the spring plates that connect the cover to the clutch pressure plate with the screwdriver.

Using an 18 mm socket, loosen the crankshaft pulley mounting bolt and remove the screwdriver from the clutch housing window.

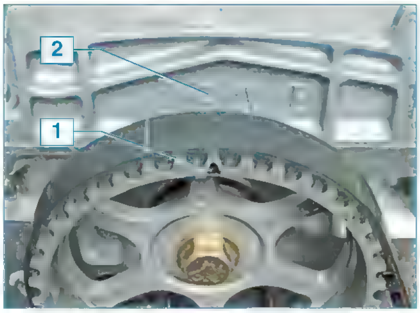


Removing the crankshaft pulley. If the pulley is difficult to remove, pry it evenly from different sides with a trim tool.

To rotate the crankshaft afterward, the pulley retaining bolt must be screwed back in. To ensure the bolt fully enters the crankshaft snout's threaded hole, place a spacer (a sleeve or a set of washers) between the bolt and the snout.

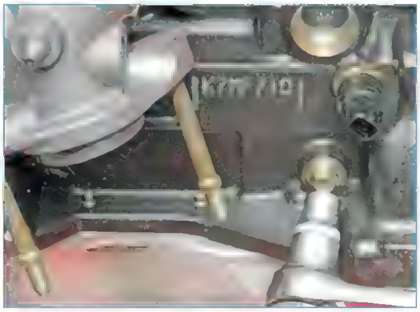
Before removing the belt, to avoid disturbing the valve timing, you must set the crankshaft and camshaft to the TDC (top dead center) position of the compression stroke of cylinder 1.

Turn the crankshaft clockwise using the bolt on its pulley until the moment of alignment...

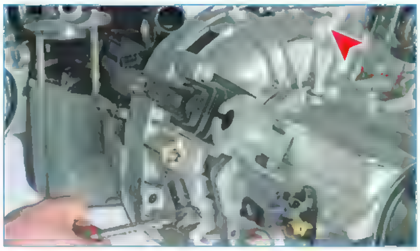


...mark 1 (triangular recesses) on the timing pulley of the camshaft with mark 2 (the "Dacia" logo, through which an imaginary vertical axis passes of the pulley) on the cylinder head cover.

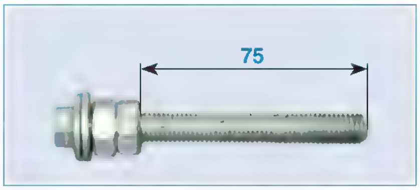
To check that the crankshaft is at TDC for the pistons of cylinders 1 and 4, the engine block has an M10 threaded hole into which a special locating pin with a 75 mm threaded length must be screwed. When the crankshaft is at TDC for pistons 1 and 4, the pin should bear against the machined pad on the crank cheek and lock the shaft against clockwise rotation.



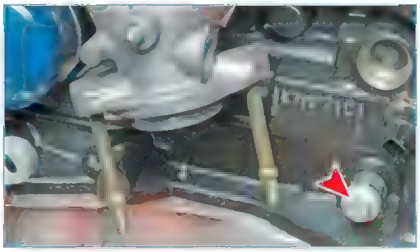
Use a hex socket "E-14" to unscrew the service plug from the threaded hole in the cylinder block located on the front side of the block, in the area of cylinder 1 — beneath the oil pressure warning sensor (shown on a removed engine for clarity).



As a locating pin you can use the bolt from the upper transmission mounting to the cylinder block (shown on a removed power unit for clarity).

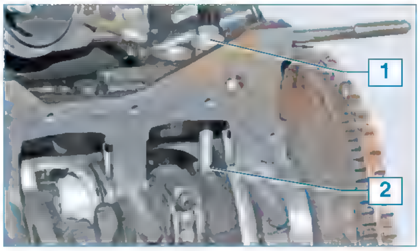


Screw two nuts onto the bolt and lock them so that the length of the threaded portion is 75 mm. The fabricated tool — the locating pin...



...is screwed into the threaded hole of the cylinder block.

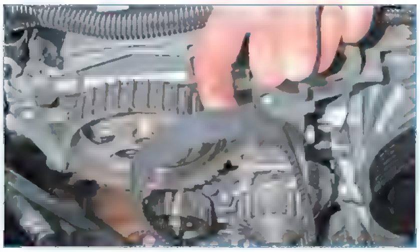
With the crankshaft at TDC for pistons 1 and 4...



...the locating pin 1 will be screwed in until the end of its thread and will bear against the milled face 2 on the crankshaft cheek (shown on a disassembled engine and with the oil pan removed for clarity).

In this case the crankshaft will not be able to be turned clockwise. If, when screwing in the locating pin, you feel it has hit an obstruction, and the end of the nut on the pin does not contact the end of the boss of the hole in the cylinder block (a gap remains between the nut and the boss), slightly rotate the crankshaft counterclockwise using the pulley retaining bolt. Then screw the locating pin fully into the block hole (until the ends of the pin nut and the hole boss in the block make contact) and rotate the crankshaft clockwise until the cheek face comes to rest against the pin.

Loosen the tensioner pulley retaining nut and rotate the pulley clockwise to reduce the timing belt tension.



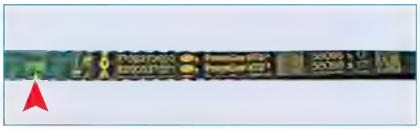
Removing the timing belt.

After removing the belt, do not rotate the crankshaft or camshafts to avoid the valves striking the pistons.

When replacing the belt, you should also replace the tensioner pulley. Unscrew the nut of its mount...

...and remove the tensioner pulley.

Install the new tensioner pu-лик и ремень привода ГРМ в обрат- ной последовательности. При установке ремня... -> remove and install the timing drive belt in reverse order. When fitting the belt...



...on which arrows are marked...

...orient it so that the arrows align with the direction of belt travel (clockwise).

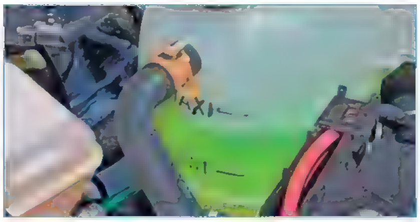
With the belt fitted on the crankshaft pulley, guide the belt under the tensioner pulley and fit it onto the camshaft and coolant pump pulleys. Tension the timing belt as shown above. After unscrewing the locating pin from the hole in the cylinder block, turn the crankshaft two revolutions clockwise using the pulley retaining bolt until the mark on the camshaft pulley aligns with the mark on the cylinder head cover. Then screw the locating pin into the hole in the cylinder block to verify the crankshaft is at TDC for pistons 1 and 4 (see above) and, if necessary, repeat the belt installation. Unscrew the pin from the hole in the cylinder block and reinstall the threaded plug. Refit removed parts in reverse order.

Replace the bolt securing the auxiliary drive pulley with a new one and tighten it to the specified torque (see "Appendices", p. 315). For reliable engine operation and to ensure the specified service life of the timing belt, it is best to have the belt tension checked at a service center using a tensometric sensor.

Checking the level and topping up the engine coolant 1.4–1.6 (8V)

You should check the coolant expansion tank fluid level at every vehicle inspection before setting off and always if the engine overheats and fluid is expelled from the system. To check the fluid level, place the vehicle on a level surface.

The fluid level should be checked with the engine cold.



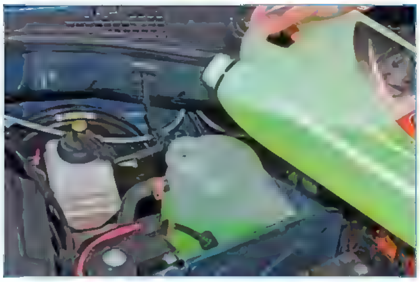
The expansion tank's side wall is marked with MAXI and MINI; on a cold engine the fluid level should be between these marks.

When the engine is warmed to operating temperature, the coolant level in the tank may be slightly above the MAXI mark.

When the engine is hot, the coolant in the cooling system is under excess pressure. To avoid burns, do not unscrew the expansion tank cap until the engine has cooled to below 60 °C.

If it is necessary to add fluid to the system on the road while the engine is hot, stop the engine. After waiting at least ten minutes, cover the expansion tank cap with a cloth and unscrew it a quarter turn to relieve the excess pressure in the cooling system. If the fluid level is at the MINI mark or below...

...unscrew the expansion tank cap...



...and add coolant to the reservoir a little short of the MAXI mark.

Wipe away any coolant spills with a cloth. Screw the expansion tank cap back on.

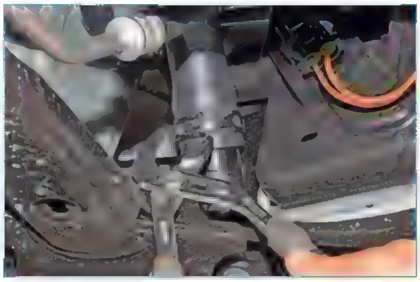
If the fluid level in the expansion tank continually drops, there is a leak in the cooling system. In that case, check the cooling system for leaks and repair the fault.

Engine coolant replacement 1.4–1.6 (8V)

According to the maintenance schedule, the coolant is replaced every 90,000 km or every 3 years, whichever comes first.

Perform the work on a cold engine with the vehicle placed over an inspection pit or on a ramp. If the engine is hot, allow it to cool, then relieve the excess pressure in the cooling system (see "Checking the level and topping up the engine coolant for 1.4–1.6 (8V) engines", p. 37). Remove the powertrain splash shield (see "Removing the powertrain shield", p. 283). There are no drain plugs provided in the radiator or the engine block.

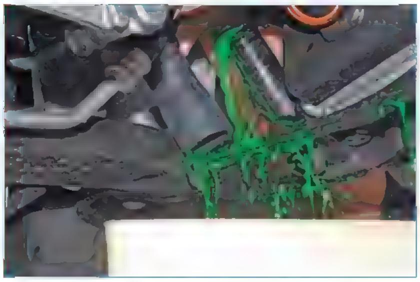
Place a wide container with a capacity of at least 6 liters under the radiator. To reduce the intensity of the fluid drain—at the initial moment, tightly screw the expansion tank cap. From beneath the vehicle...



...with slip-joint pliers we crimp the ends of the clamp and...

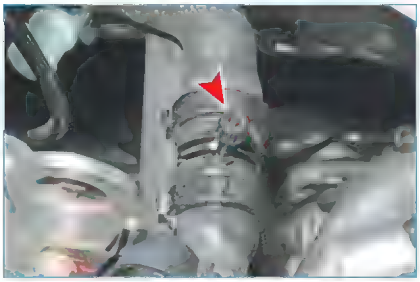
crimp the clamp ends and slide the clamp along the hose.

slide the clamp along the hose.



Disconnect the hose from the radiator neck and drain the fluid into a container placed underneath.

To increase the flow of draining fluid, loosen the expansion tank cap...

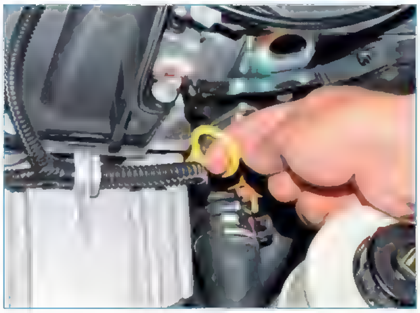


...and the fitting cap (for venting air from the cooling system), located on the supply hose to the heater. After the coolant stops flowing, we put the return hose on the radiator neck and secure it with a clamp. We fill the engine cooling system with fluid through the expansion

Fill the reservoir until the fluid begins to run out of the air-release fitting—open the cap of the air-release fitting and the expansion-tank cap. Start the engine. As the engine warms up, the lower (outlet) radiator hose should remain cold for a while and then suddenly heat up, indicating that the coolant has begun circulating through the main loop. Once the cooling fan engages, stop the engine. After the engine cools, check the coolant level and top it up to the proper level if necessary.

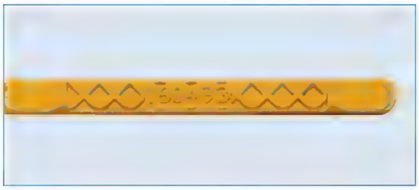
Checking the oil level in the 1.6 (16V) engine

Check the oil level in the oil sump with the engine off and the vehicle parked on a level, horizontal surface. If the engine was running before the check, stop it. Wait at least three minutes (the oil must have time to drain into the engine oil sump) and pull out the oil level indicator (dipstick)...



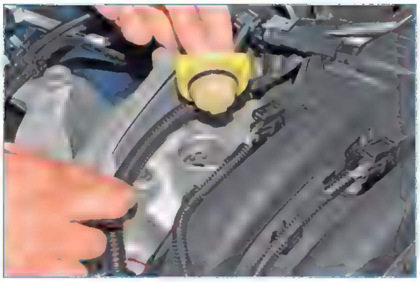
...from the guide tube. Wipe the dipstick with a clean cloth and insert it into the guide tube until it seats. Withdraw the dipstick again and determine the engine crankcase oil level by the edge of the oil film on it.

The edge of the oil film should be located on the dipstick...

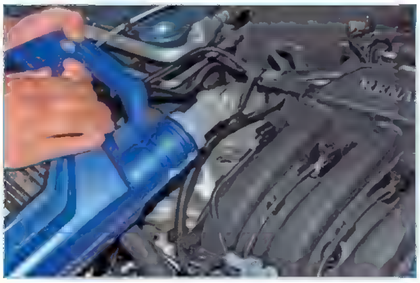


...on the section with the knurling.

Operating the vehicle with the oil level on the dipstick below the knurled section can lead to engine failure and, consequently, costly repairs. With a low oil level, turn counterclockwise...



...and remove the oil filler cap of the filler neck.



Through the filler neck, add oil to the engine in small amounts. You should add oil of the same grade that was originally used in the engine.

Wait at least three minutes to allow the added oil to drain into the oil pan, then check the oil level again. Reinstall the oil level dipstick.

When adding oil, do not allow its level on the gauge to rise above the hashed area. Otherwise, oil will be drawn through the crankcase ventilation system into the combustion chambers, and the combustion products of the oil can damage the catalytic converter.

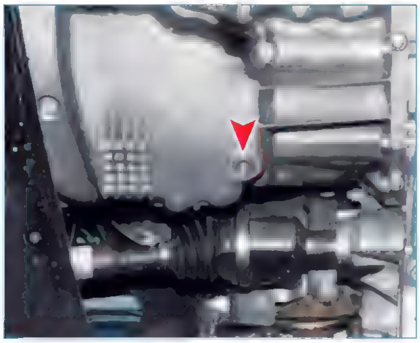
Oil and Oil Filter Replacement engine 1.6 (16V)

According to the maintenance schedule, the oil is changed every 15,000 km.

Work is carried out in an inspection pit or on a ramp. Remove the powertrain protection (see “Removing the Powertrain Protection”, p. 283). Perform the replacement on a warm, stationary engine, preferably immediately after a drive while the oil has not yet cooled.

Use oils recommended by the manufacturer (see “ Appendices”, p. 315).

Remove the oil filler cap. From underneath the vehicle, clean the oil pan around the drain hole of dirt. Use a 8 mm square drive to loosen the fastener...



...of the drain hole plug.

Place a wide container for the used oil with a capacity of at least 5 liters. After unscrewing the plug by hand, drain the oil.

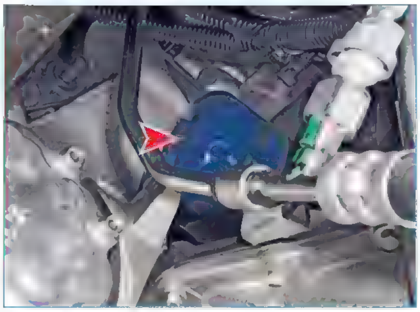
Be careful — the oil is hot.

A steel washer is installed under the plug.

To prevent oil from leaking from under the oil pan through the surface of the washer hole, a thin layer of rubber has been vulcanized onto it.

Inspect the washer. If the rubber seal of the washer is damaged, replace the washer with a new one. If an original washer is not available, a copper washer with an 18 mm hole diameter can be used under the plug. Drain the oil for at least ten minutes. Screw in and tighten the drain plug. Remove oil drips from the engine oil pan.

When changing the oil, you must replace the oil filter.



Unscrew the oil filter by turning it counterclockwise. If you cannot do this by hand, loosen the filter with a removal tool. If a remover is not available, drive a sturdy screwdriver into the filter housing (closer to the bottom of the filter to avoid damaging the engine fitting) and use the screwdriver as a lever to unscrew the filter.

Clean the filter seating on the cylinder block of dirt and oil drips. Apply engine oil to the filter sealing ring and screw the filter on by hand until the sealing ring contacts the cylinder block. Tighten the filter a further 2/3 of a turn to seal the connection. Through the oil filler neck, pour 4.75 L of engine oil into the engine. Close the oil filler cap. Start the engine for 1–2 minutes. Make sure that in the instrument

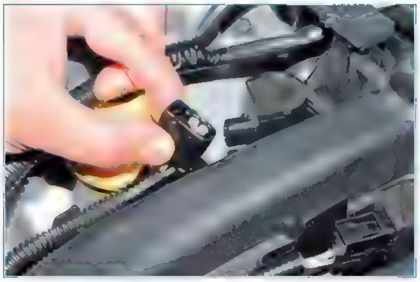
When the instruments indicate the low (warning) engine oil pressure light and there are no oil leaks from the drain plug or the filter, stop the engine. After a few minutes (to allow the oil to drain back into the oil pan), check the oil level and bring it up to the proper level. If necessary, tighten the oil filter and the drain plug.

Spark Plug Replacement for 1.6 Engine (16V)

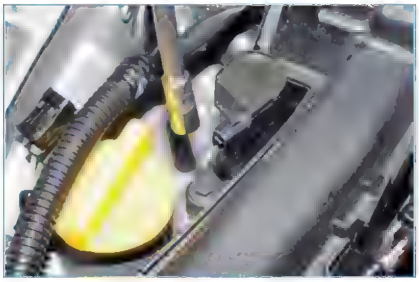
The manufacturer recommends using EYQUEM RFC58LZ2E or SAGEM RFN58LZ spark plugs, as well as CHAMPION RC87YCL.

According to the maintenance schedule, replace the spark plugs every 30,000 km.

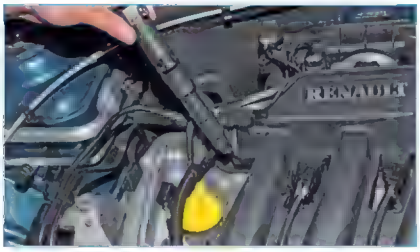
Work is done on a cold engine.



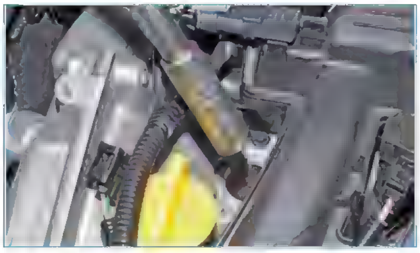
Pressing the retainer, disconnect the wiring harness plug from the ignition coil.



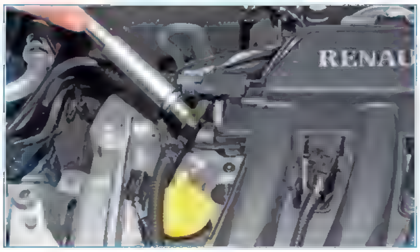
Using an 8 mm socket, loosen the ignition coil retaining bolt.



Remove the coil boot from the spark plug.



Using a deep 16 mm spark plug socket with an extension, unscrew—remove the spark plug...



...and pull it out of the spark plug well.

Install the new plug in reverse order.

When screwing in the spark plug, turn the spark-plug wrench or the extension with the socket by hand, not with a breaker bar or ratchet, to avoid damaging the threads of the spark-plug hole in the cylinder head.

If the plug is cross-threading, you will feel strong resistance to turning. In that case, fully remove the plug, clean the threads, and reinstall. Finally, tighten the plug to the specified torque (see " Appendix," p. 315).

! **Over-tightening spark plugs can damage the threads in the spark plug holes of the cylinder head.**

Replace the remaining spark plugs in the same way.

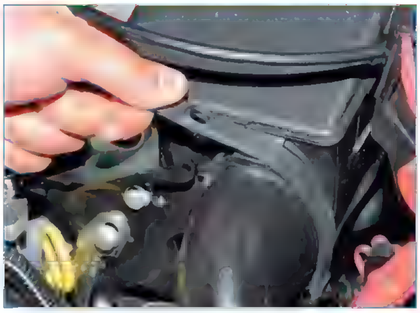
Replacement of the air filter element for the 1.6 (16V) engine

The air filter element should be replaced every 15,000 km.

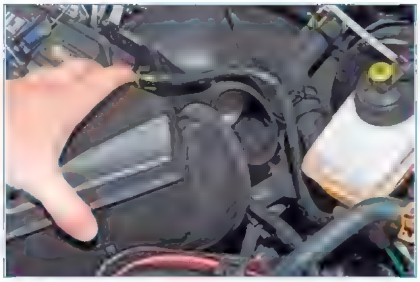
If the vehicle is operated in dusty conditions, the interval between element replacements should be halved.

A deformed or damaged component must be replaced regardless of mileage.

! **A damaged or heavily soiled air filter element can cause severe wear and reduced engine power.**



Disconnect the rubber clamp securing the intake resonator.



Disconnect the resonator duct from the duct on the air filter housing cover...

...and move the resonator aside.

Using a Torx T-20 key, unscrew the two screws securing the cover to the air filter housing.

Remove the air filter housing cover with the replaceable element...

...and take out the replaceable element.

Clean the cavity of the air filter cover and install the new element in the reverse order.

Clean the cavity of the air filter and install the new element in the reverse order.

Replacement of the drive belt for the engine auxiliary units 1.6 (16V)

According to the maintenance schedule, the belt must be replaced every 60,000 km or every 4 years (whichever comes first), regardless of its condition.

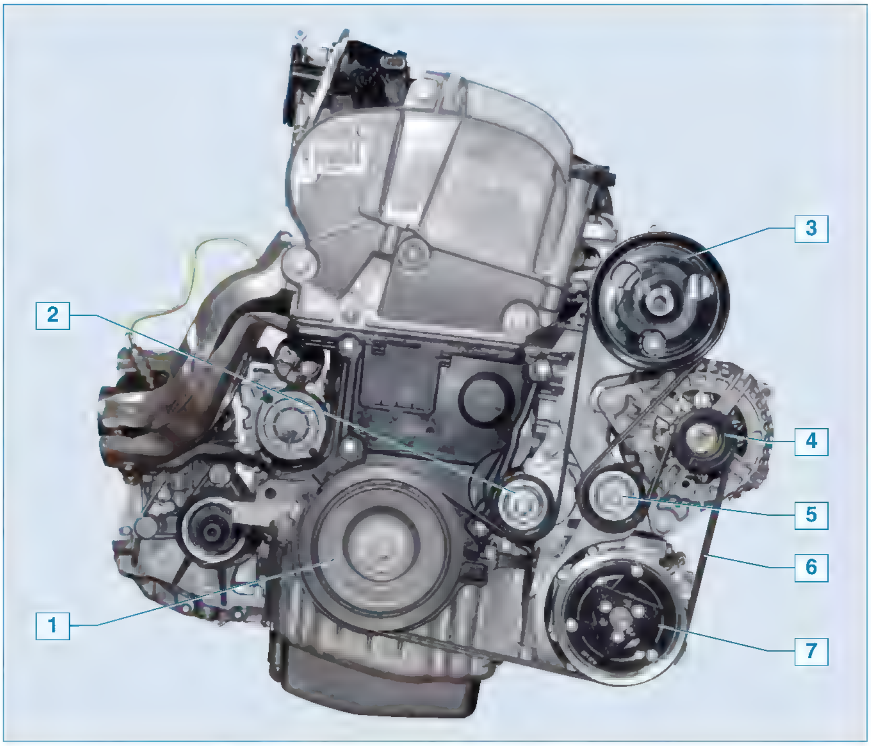


Diagram of the auxiliary drive with air conditioning: 1 – auxiliary drive pulley; **2** – tensioner pulley; **3** – power steering pump pulley; **4** – alternator pulley; **5** – support roller; **6** – belt;**7** – air conditioning compressor pulley

Perform the work over an inspection pit or on a ramp.

At each scheduled maintenance service, we recommend checking the condition of the auxiliary drive belt.

auxiliary units. If any of the following are found,

cracks, tears, or separation of the rubber from the fabric backing on the belt,

the belt must be replaced.

less needs to be replaced.

Depending on the vehicle's trim level, there are two possible configurations of auxiliary drive systems

of assemblies (with and without air conditioning). The procedure is shown

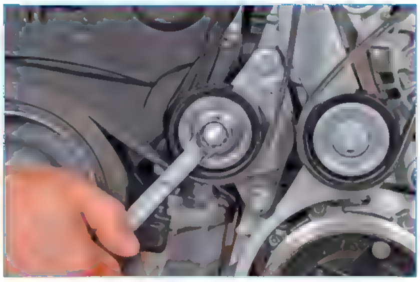
on the vehicle equipped with air conditioning.

Belt tension is adjusted automatically by the tensioning device. To replace the belt, remove the right splash shield of the engine compartment (see “Removing the engine compartment splash shields,” p. 283).

of the engine compartment (see “ Removing the engine compartment splash shields,” p. 283).

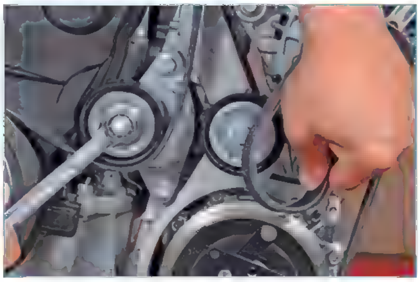
To loosen the belt tension, fit an open-end or 15mm socket wrench onto the bolt from beneath the car

of the tensioner pulley fastening.

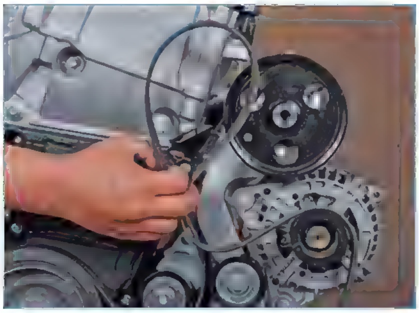


Rotate the idler bracket clockwise, overcoming the resistance of the tensioner spring (for demonstration purposes-

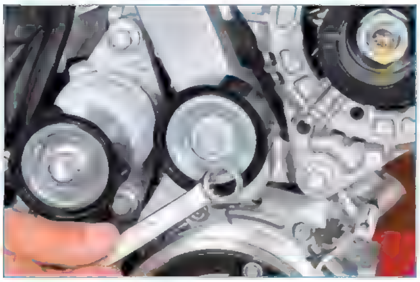
but on an engine that has been removed)...



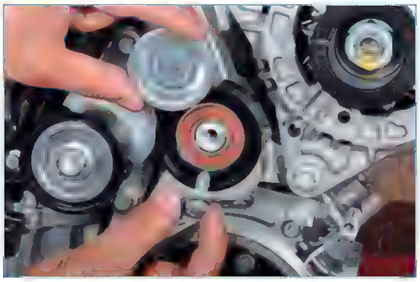
...and remove the belt from the support roller.



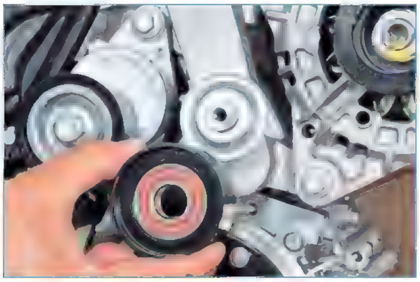
Remove the auxiliary drive belt from the pulleys.
Auxiliary drive belt marking with air conditioning – 6 RK 1822 (six-rib, 1822 mm long). When replacing the belt, you must also replace the idler and tensioner pulleys. To replace the idler pulley...



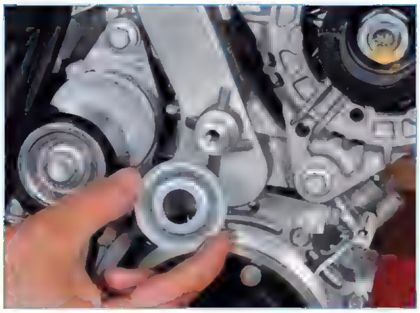
...use an open-end wrench or a 13 mm socket to loosen the mounting bolt...



...and remove the outer cover of the pulley.

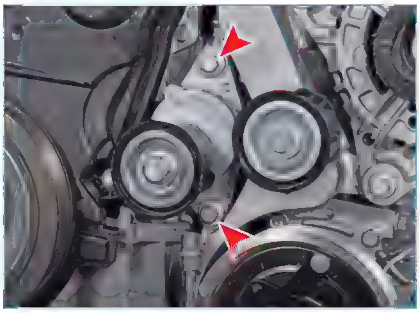


Remove the idler pulley...

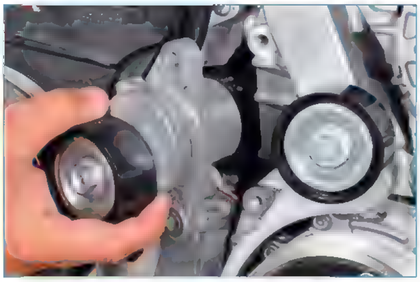


...and its inner cover. We similarly remove the tension pulley.

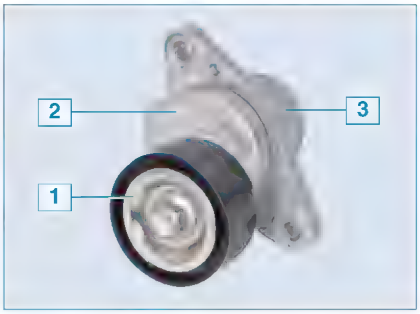
If it is necessary to replace the tensioning device (for example, if the spring breaks)...



...using a 10mm socket, we loosen two bolts...



...and remove the tensioner assembly together with the pulley.



Tensioning device: 1 – tension roller: **2** – roller bracket; **3** – housing

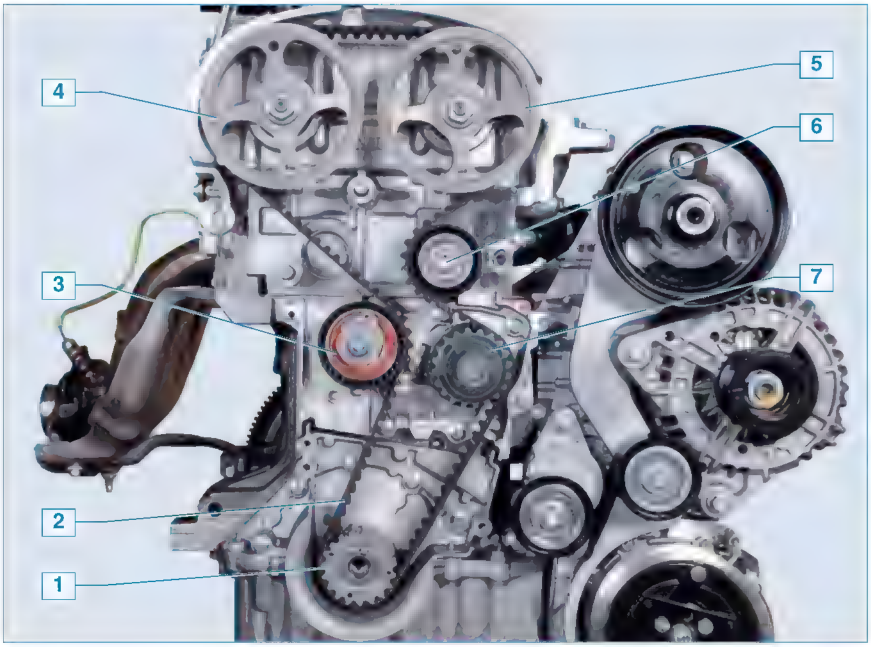
Reassemble the parts in reverse order. When fitting the belt, lay it on the pulleys and guide it under the tensioner and idler rollers according to the diagram.

Inspection and replacement of the timing drive belt for the 1.6 (16V) engine

According to the maintenance schedule, the timing drive belt (timing belt) should be replaced every 60,000 km or every 4 years (whichever comes first), regardless of its condition.

The work is carried out on an inspection pit or a ramp. Failure of the belt (breakage or tooth shear) will cause the valves to strike the pistons due to desynchronization of the crankshaft and camshaft rotation angles and, as a result, to costly engine repairs. Therefore, we recommend checking the condition of the belt at every vehicle service. The toothed surface of the belt must not have folds, cracks, tooth undercuts, or fabric delamination from the rubber. The back side of the belt must not show wear that exposes the cord fibers or signs of scorching. The belt's end faces must not show delamination or fraying. The belt must be replaced if any traces of oil are found on it.

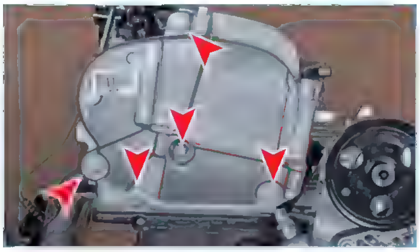
To assess the condition of and replace the timing belt, remove the right engine mount (see "Replacing the engine mounts," p. 145) and the right splash shield of the engine compartment (see "Removing engine compartment splash shields," p. 283).



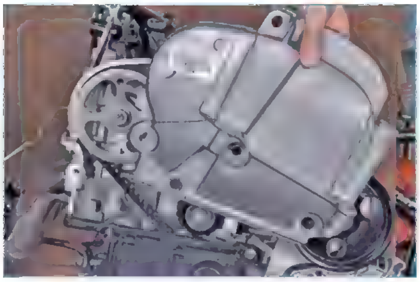
Timing drive: 1 – crankshaft toothed pulley; **2** – timing belt; **3** – tensioner pulley; **4** – toothed pulley of the exhaust camshaft drive; **5** – toothed pulley of the intake camshaft drive; **6** – idler pulley; **7** – water pump toothed pulley

---

For clarity, we demonstrate the procedure on a disassembled engine.



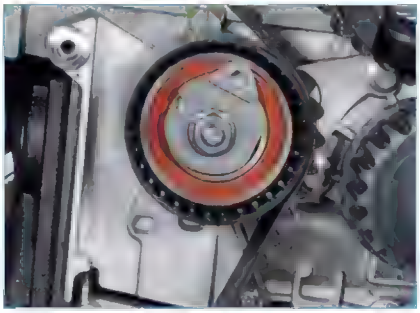
Using a 13 mm socket, loosen the three bolts and two nuts...



...and remove the upper timing belt drive cover.

Using an 18 mm socket, turn the crankshaft clockwise by the bolt securing the auxiliary drive pulley of the auxiliary units and visually inspect the condition of the timing belt.

You can assess the belt tension by the position of the automatic belt tensioner indicators.



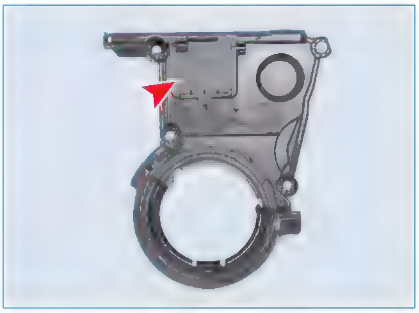
With correct belt tension, movable pointer 1 should align with the notch of fixed pointer 2 on the tensioning device (shown here with the lower timing cover removed for clarity).

If the movable indicator is displaced relative to the fixed one: – counterclockwise – the belt tension is insufficient;

– clockwise – the belt is overtightened.

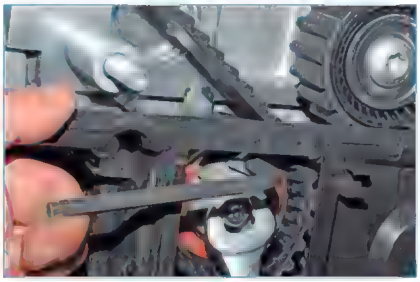
In both cases the belt tension should be adjusted.

To adjust the belt tension...



...there is a flap in the lower timing drive cover, closed by a lid (shown on the removed cover for clarity)...

Pulling upward, remove the access hatch cover.



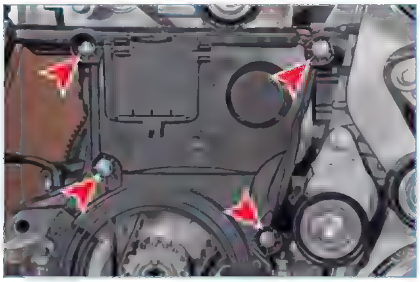
Loosen the tensioner mounting nut with a 13 mm wrench, then turn the pulley clockwise with a 6 mm hex wrench to tension the belt.

Holding the pulley in this position, tighten the tensioner mounting nut. Rotate the crankshaft two full turns clockwise around the auxiliary drive pulley mounting bolt, then recheck the belt tension and repeat the adjustment if necessary. Reinstall the removed parts in reverse order.

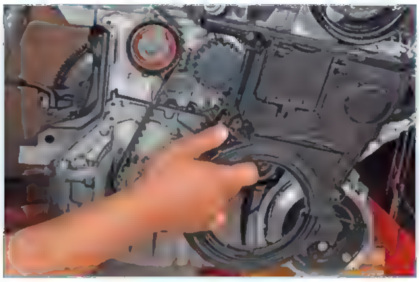
To replace the timing belt, remove the auxiliary drive belt (see “ Replacing the auxiliary drive belt — 1.6 (16V) engine”, p. 41).

Remove the upper (see above) and lower timing drive covers.

To remove the lower timing cover...



...use an 8 mm socket to loosen the four mounting bolts...



...and remove the lower cover.
When loosening the bolt that secures the accessory drive pulley, you must lock the crankshaft to prevent it from turning. To do this, an assistant should engage fifth gear and press

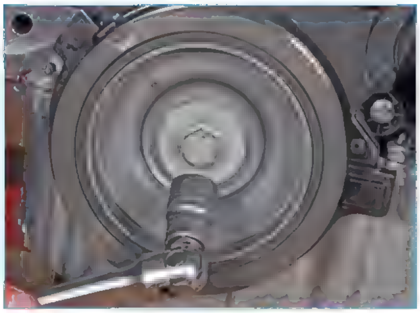
on the brake pedal. If you cannot loosen the bolt securing the pulley because the crankshaft is turning, the shaft must be locked.

the crankshaft must be secured.

To do this, we remove the sensor posi- of the crankshaft (see “Removing the crankshaft position sensor,” p. 157).

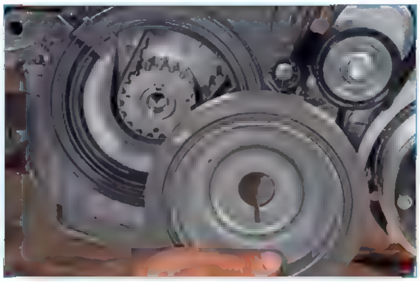
We lock the crankshaft...

...by inserting a pry bar between the teeth of the flywheel through the opening in the clutch housing.



Using an 18mm socket, loosen the bolt securing the drive pulley of the auxiliary units...

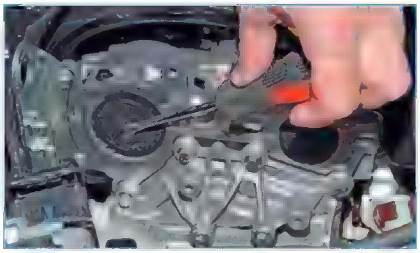
...and remove the bolt with the washer.



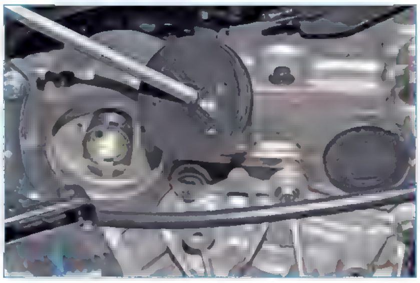
Removing the drive pulley of the auxiliary units.
If the pulley is difficult to remove, pry it off evenly from different sides with a trim tool.
There are no special timing marks on the crankshaft and camshaft pulleys.
To avoid upsetting the valve timing, before removing the timing belt you must set the crankshaft and camshafts to TDC (top dead center) of the compression stroke of cylinder 1.

Для turning crank-
После установки вала вала вворачиваем на место болт крепления шкива привода вспомогательных агрегатов, установив между шайбой болта и торцом вала проставку (втулку или набор шайб).

To determine the position of the camshafts, remove the two rubber-metal plugs from the holes in the left end of the cylinder head. Remove the air-tract resonator (see “Replacing the engine 1.6 (16V) air filter element,” p. 40).

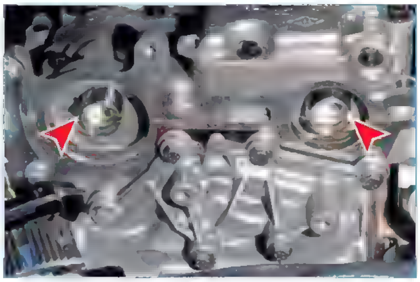


In the center of the plug (the rubber mass), pierce a hole with a screwdriver and, using the screwdriver as a lever...



...remove the plug from the hole in the cylinder head. Remove the other plug in the same way.

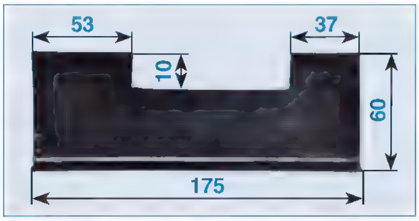
Rotate the crankshaft clockwise using the bolt that secures the drive pulley for the auxiliary units until...



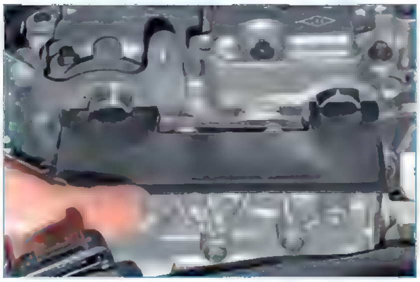
...the slots on the ends of the camshafts assume a horizontal position (becoming parallel to the mating plane of the cover and the cylinder head).

and will be shifted downward relative to the camshaft axes.

To lock the camshafts when replacing the belt, a simple tool can be made from a 5 mm thick metal plate (see sketch).

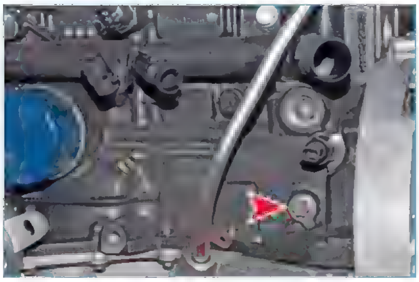


Tool for locking the camshafts.

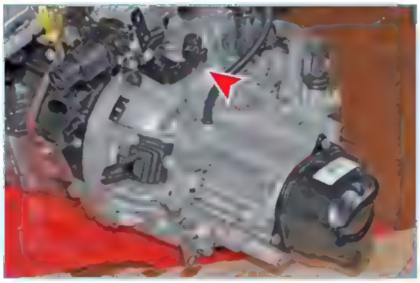


We install the tool
into the shaft slots.

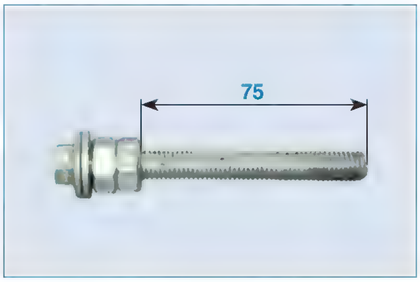
To check that the crankshaft is at TDC for the pistons of the 1st and 4th cylinders, the cylinder block has a threaded M10 hole into which a special locating pin with a 75 mm long threaded section must be screwed. When the crankshaft is at TDC for the pistons of the 1st and 4th cylinders, the pin should bear against the machined pad on the crank cheek and lock the shaft if an attempt is made to turn it clock wise.



Using socket «E-14», unscrew the service plug from the threaded holes in the cylinder block located on the front side of the block in the area of the 1st cylinder — under the oil pressure warning sensor (shown on the removed engine for clarity).

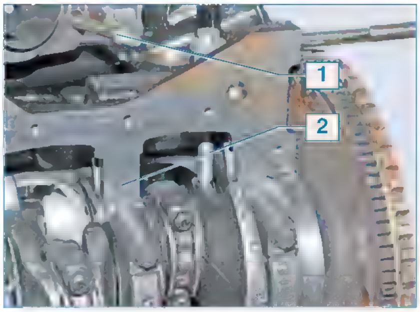


As a locating pin you can use the bolt that secures the top of the gearbox to the cylinder block (shown on the removed power unit for clarity).



Screw two nuts onto the bolt and lock them so that the length of the threaded portion is 75 mm. The fabricated tool — the locating pin — is screwed into the threaded hole of the cylinder block.

When the crankshaft is at the TDC position of the pistons in cylinders 1 and 4...



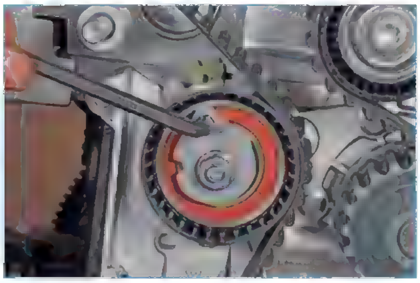
...the locating pin 1 will be screwed into the hole up to the end of its thread and will bear against the machined face of the the pad 2 on the crankshaft cheek (shown for clarity on a disassembled engine and with the oil pan removed).

In this position the crankshaft will not be able to be turned clockwise.

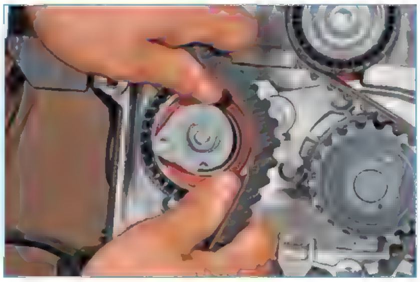
If, when screwing in the locating pin, you feel it has stopped but the end face of the nut on the pin does not contact the face of the boss in the cylinder block (a gap remains between the nut and the boss), slightly turn the crankshaft counterclockwise using the pulley mounting bolt. Then screw the locating pin fully into the block (until the end faces of the pin's nut and the block boss meet) and turn the crankshaft clockwise until the cheek face comes to rest against the pin.

Loosening the nut that secures the tensioner pulley, we turn the pulley clockwise to reduce the timing belt tension.

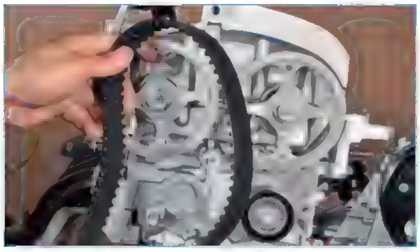
Loosening the nut securing the tensioning device with a 13 mm wrench...



...we turn the pulley counterclockwise to reduce the timing belt tension...



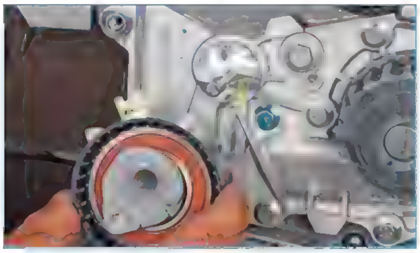
...and remove the belt from the tensioner pulley...



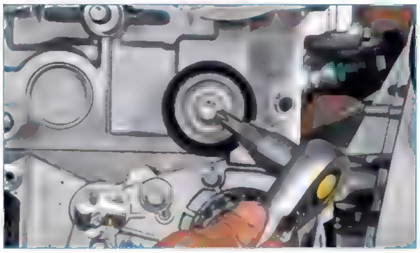
...and then — from the pulleys of the coolant pump, the crankshaft, and the camshafts.

When replacing the belt, you should also replace the tensioning assembly and the idler pulley.

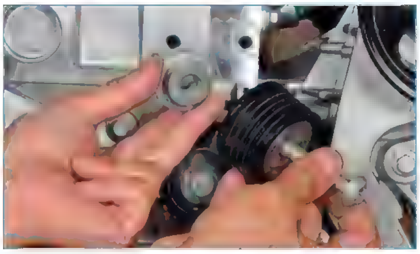
Loosen the nut securing the tensioner...



...and remove it.



Use a Torx T-50 key to loosen the bolt securing the idler pulley.



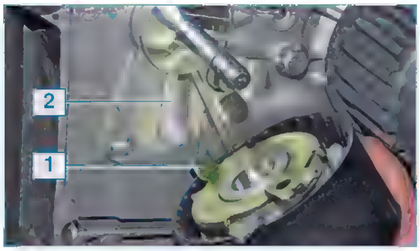
Remove the idler pulley and the pulley bushing.

Install the new idler pulley in reverse order. When installing a new timing belt that has arrows, position it so that the arrows align with the direction of belt travel (clockwise).

Place the belt onto the toothed pulleys of the crankshaft, the coolant pump, and the camshaft pulleys.

Then simultaneously place the belt on the tensioner pulley and mount the tensioner onto the stud of the coolant pump housing.

When installing the tensioner...



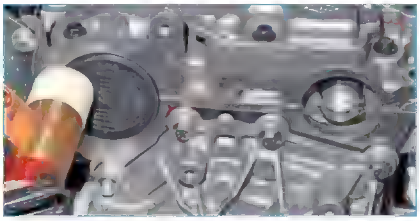
...insert the bent end of bracket 1 into recess 2 of the coolant pump housing.

Unscrew the locating pin from the hole in the cylinder block.

Rotate the crankshaft two turns clockwise using the bolt on the accessory drive pulley until the slots on the ends of the camshafts align.

Screw the alignment pin into the hole in the cylinder block to check that the crankshaft is correctly set to TDC for cylinders 1–4. If necessary, repeat the timing belt installation.

Unscrew the alignment pin from the hole in the cylinder block and reinstall the threaded plug in its place. Refit removed parts in the reverse order.



Using light blows with a hammer fitted with a plastic striker, press the new plugs into the holes in the cylinder head.

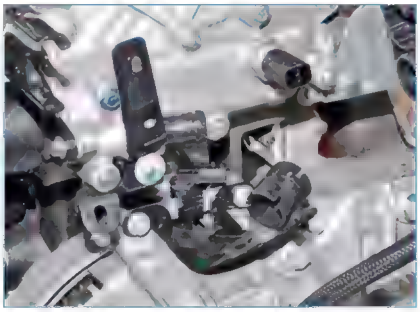
Reassemble the engine in the reverse order. Replace the bolt securing the accessory drive pulley with a new one and tighten it to the specified torque (see " Appendices", p. 315).

Checking and topping up the engine coolant 1.6 (16V)

The procedures for checking and topping up the coolant are the same as those for the 1.4–1.6 (8V) engines (see “Checking and topping up the engine coolant 1.4–1.6 (8V)”, p. 37).

Engine coolant replacement 1.6 (16V)

The procedures for replacing the coolant are similar to the corresponding procedures on the 1.4–1.6 (8V) engine (see “Engine coolant replacement 1.4–1.6 (8V)”, p. 38). To bleed air from the cooling system when filling the fluid, remove the air-duct resonator (see “ Replacement of the engine 1.6 (16V) air filter element”, p. 40)...



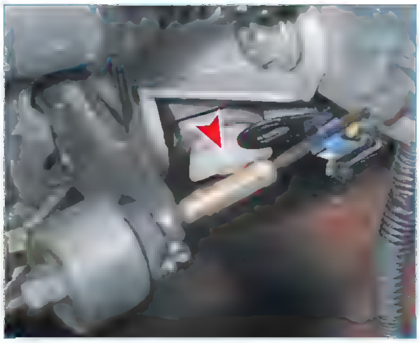
...and use a 10 mm wrench to unscrew the plug on the thermostat housing.

Checking the level and topping up the oil in the manual transmission

The transmission oil filled in the gearbox is designed to last for the vehicle's entire service life, and the maintenance schedule does not include operations for checking the level or replacing the oil.

Nevertheless, we recommend checking the oil level in the gearbox at every service and always if a leak from the gearbox is detected.

The work is performed over an inspection pit or on a ramp.
We check the oil level through the inspection (filler) hole on a cooled gearbox. The inspection hole is located on the front wall of the gearbox housing and is closed with a threaded plastic plug.



Location of the gearbox inspection-hole plug

Access to the inspection hole on vehicles with 1.4–1.6 (8V) engines is possible from above through the engine bay; on a vehicle with a 1.6 (16V) engine it is more convenient to unscrew the plug from beneath the car (with the powertrain protection removed).

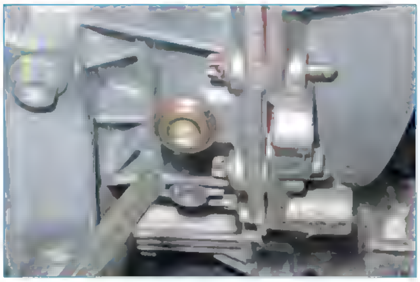
Wipe the gearbox housing around the inspection hole with a rag.

Unscrew the inspection-hole plug counterclockwise.

The gearbox oil level should be at the lower edge of the hole, which can be checked with a finger. If necessary, oil can be added to the gearbox from beneath the vehicle using a syringe for filling transmission oil (on cars with 1.4–1.6 (8V) engines the oil can be added from above through the engine compartment using a funnel and a hose inserted into the inspection hole). Add the same brand of oil that was originally in the gearbox.
When adding oil from beneath the vehicle, remove the powertrain shield (see “Removing the powertrain shield,” p. 283).

Add oil to the gearbox until it reaches the lower edge of the hole (oil will begin to flow out of the opening).

When the excess oil has flowed out, wipe away any oil traces with a rag and screw the plug back in.
If you need to drain the gearbox oil (for example, when replacing the right-wheel drive shaft seal), clean the gearbox housing around the drain hole. Place a container with a capacity of at least 3.5 liters under the drain hole.



Use an 8 mm square drive to unscrew the drain plug...

...and drain the oil into the container.

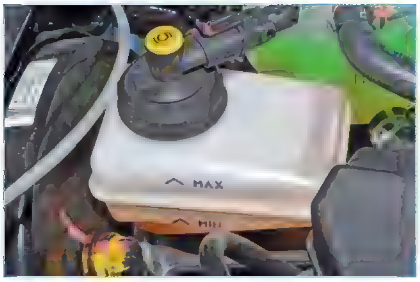
A copper washer is installed under the plug for sealing.
At the end of draining, screw in the drain plug. After completing the repair work, fill the gearbox with oil through the inspection hole and screw in the plug.

Checking the fluid level in the brake system hydraulic reservoir

The brake hydraulic fluid reserve is in the reservoir located on the master brake cylinder.

A sensor is installed in the reservoir cap to monitor the fluid level. If the fluid level falls below the permissible limit, the parking brake and brake system fault warning lamps light up in the instrument cluster. If there are no leaks in the brake system, the fluid level in the reservoir drops due to wear of the front brake pad linings. Despite the presence of the sensor, we recommend visually checking the reservoir fluid level before driving, since a malfunction can occur during operation in the sensor itself, in the instrument-cluster warning lamp, or in their electrical circuits.

To check the fluid level, we park the car on a level surface.



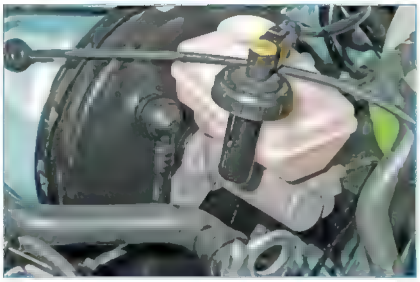
The reservoir is marked MIN and MAX; the working fluid level should be between these marks.

! Do not allow the fluid level to fall below the MIN mark.

To add working fluid to the reservoir...

...unscrew and remove the cap with the sensor, without disconnecting the wire connector from the sensor.

At this point it's convenient to check the correctness of the fluid level sensor. To do this...



...place the sensor in a vertical position on the hydraulic reservoir tank.

If the sensor is functioning, then with the ignition on the parking brake and brake system fault indicator in the instrument cluster should be illuminated (the parking brake lever must be fully lowered during the check).

We top up the fluid in the reservoir to the MAX mark.

Screw the reservoir cap back on.

! Brake fluid that gets on painted surfaces, plastic parts, or the vehicle's wiring can cause damage. Wipe it off immediately with a clean cloth.

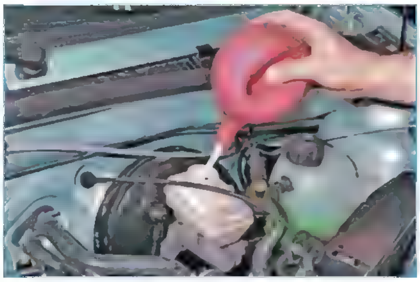
If the brake fluid level in the reservoir keeps dropping, there is likely a leak in the system. In that case, check the hydraulic brake system for leaks and fix the fault.

Fluid replacement in the hydraulic brake system

Replace the working fluid in the hydraulic brake system according to the maintenance schedule — every 90,000 km or every three years (whichever comes first).

Perform the work in an inspection pit or on a service ramp.

When replacing...



...we pump out the old fluid from the reservoir with a rubber bulb...

...and pour new fluid into the reservoir. Bleed the brake hydraulic system (see “Bleeding the brake hydraulic system”) until the new fluid (lighter in color than the old) begins to flow from the bleed nipples of all wheel cylinders. After

while bleeding, we bring the fluid level to-
the brake hydraulic reservoir
reaches the specified level.

Bleeding the brake hydraulic system

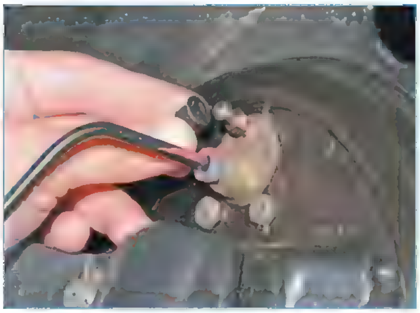
Bleed the brakes to remove air from the hydraulic system after it has been opened to atmosphere when replacing the master cylinder, wheel brake cylinders, hoses, or lines, as well as when replacing the brake fluid or if the brake pedal becomes "soft."

Work is performed in an inspection pit or on a ramp. Air is removed from the system with the engine off, first from one circuit and then from the other, in the following sequence:

- brake assembly of the right rear wheel;
- brake assembly of the left front wheel;
- brake assembly of the left rear wheel;
- brake assembly of the right front wheel.

If air enters one of the circuits, it is sufficient to bleed only that circuit, not the entire hydraulic drive. Before bleeding, check the level of hydraulic fluid in the brake system reservoir and top up the fluid if necessary (see “Checking the hydraulic brake system reservoir fluid level,” p. 47).

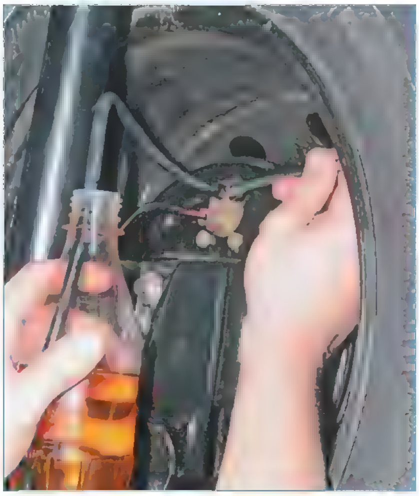
Clean the bleed nipple of the right rear wheel brake mechanism from dirt...



...and remove its protective cap.

Using an open-ended wrench or an 8 mm socket, loosen the bleed nipple Attach a hose to the nipple and submerge its free end into a container partially filled with brake fluid.

An assistant should press the brake pedal firmly to the floor 4–5 times and hold it down.



Turn the bleed nipple 1/2–3/4 of a turn with an 8 mm wrench.

Fluid with air bubbles will flow out of the hose, and the brake pedal will move forward. As soon as the fluid stops flowing from the hose (at which point the pedal should be fully depressed), tighten the nipple, and only then may the assistant release the pedal.

Repeat bleeding until bubbles of air no longer appear in the fluid coming out of the hose. Remove the hose, wipe the bleed nipple dry and fit the protective cap.

Bleeding/priming as described above...

...brake mechanism of the left re-front wheel.

Similarly, bleed/prime the brake mechanisms of the other circuit. While bleeding, monitor the fluid level in the reservoir and top up if necessary. If the brake pedal feels "soft" and has increased travel when depressed, there is air remaining in the system. In that case, repeat bleeding until the pedal becomes "firm," i.e., when pressed it travels no more than halfway to the floor. If you cannot remove the air, check the tightness of the connections, pipes, hoses, and the master and wheel cylinders. Tighten leaking connections and replace faulty master or wheel cylinders.

Power steering fluid reservoir level check

power steering pump

The power steering hydraulic fluid filled into the power steering system is intended to last for the vehicle's entire service life. The fluid level in the power steering reservoir should be checked at every maintenance service, and also whenever fluid leakage from the power steering system is detected, when steering effectiveness decreases, or when there is an unusual noise (howl) while turning the steering wheel.

It is important to pinpoint the source of the leak as accurately as possible, since in that case it will most likely be necessary to replace the worn or damaged component.

To determine the location of a leak, use the following procedure:

– with the engine off, wipe all steering components dry;

– check the fluid level in the power steering reservoir and, if necessary, bring it up to the correct level;

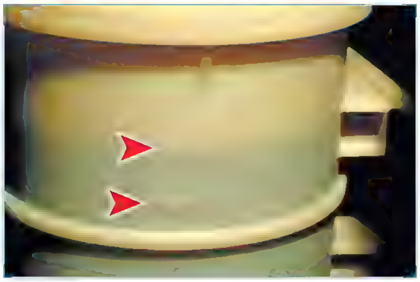
– start the engine and turn the steering wheel several times to the stop in the extreme left and extreme right positions;

– locate the exact source of the leak and eliminate the cause.

When topping up or replacing the fluid in the power steering system, you must use the working fluid recommended by the vehicle manufacturer.

The power steering reservoir is located in the engine compartment on a bracket of the upper crossmember of the radiator frame.

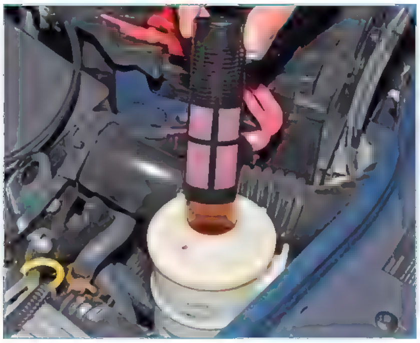
Check the fluid level in the reservoir on a level surface with the engine off and cold.



The reservoir housing is marked MINI and MAXI; the working fluid level for a cold engine should be between them.

When the engine is running, the fluid in the power steering system heats up, and the level in the reservoir may be slightly above the MAXI mark. If the fluid level falls below the MINI mark, fluid must be added. To do this...

...unscrew and remove the reservoir cap.



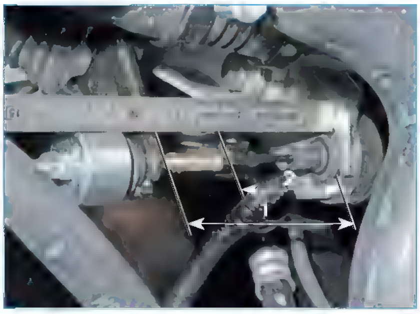
Remove the mesh filter from the reservoir. If the filter is clogged, clean and rinse it. Reinstall the filter into the reservoir.

Top up the fluid in the reservoir to the MAX level.

Tightly screw the reservoir cap back on.

Inspection and adjustment of the clutch release mechanism

At the factory, when adjusting the clutch linkage, the following are set: have the following dimensions...



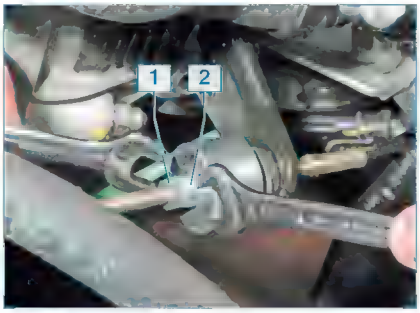
...dimension 1 (between the transmission bracket and the clutch release fork), which should be 86±5 mm, and dimension 2 (between the bracket and the swaged part of the cable threaded end), which should be

60±5 mm.

At the same time, the clutch pedal is positioned 105–110 mm from the floor — approximately level with the brake pedal.

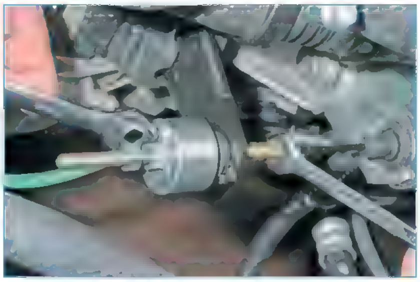
During vehicle operation the clutch discs wear, causing dimensions 1 and 2 to increase and the pedal travel to grow. The pedal sits higher relative to the floor and the clutch begins to engage at the end of the pedal travel (too high). Therefore, during service the clutch release mechanism should be checked and adjusted if necessary every 15,000 km.

Before adjustment, clean the threaded end of the clutch cable with a wire brush to remove dirt and corrosion. To adjust, on the threaded end of the cable...



...with a 10 mm wrench, loosen locknut 1 while holding adjusting nut 2 with a second wrench of the same size.

Then, with the clutch pedal released...



...with a 10 mm wrench, loosen the adjusting nut while holding the cable end by the hex with a 7 mm wrench, achieving the above-mentioned dimension 2.

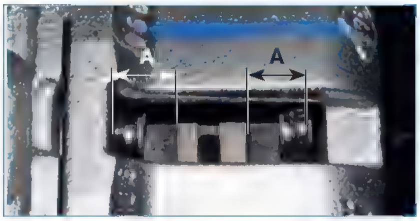
Dimension 1 is not adjusted during operation. After pressing the pedal several times, recheck the distance. For a properly adjusted clutch, the fork travel should be 28–35 mm. At the same time, reverse gear should engage with the engine running without grinding.

If necessary, repeat the adjustment. After finishing the adjustment, tighten the locknut.

Brake system condition check

According to the maintenance schedule, the manufacturer recommends inspecting the condition of the front brake pads and discs every 15,000 km, and inspecting and cleaning the rear brake pads of dust every 60,000 km. However, we recommend checking the condition of the entire vehicle brake system at every service.

Perform the work over an inspection pit or on a ramp. To check the condition and degree of wear of the pads and discs, remove the front wheels one at a time. Through the caliper opening, assess the condition of the brake pads.



If the pad thickness, including its backing plate (dimension A), is less than 6 mm, the pads must be replaced. Rotate the brake disc and inspect its friction surfaces on both sides. There must be no cracks or deep grooves on the disc's friction surfaces.

Marking on the ventilated brake disc – the disc thickness must not be less than 17.7 mm.

Marking on the cylindrical surface of the non-ventilated brake disc – the disc thickness must not be less than 10.6 mm

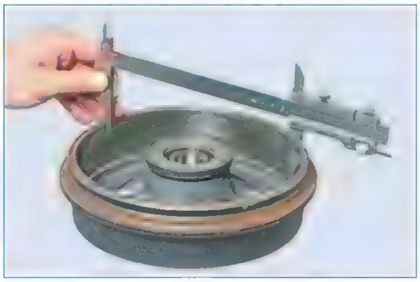
To measure the disc thickness, remove the brake pads first (see “ Replacing the front wheel brake pads,” p. 226).

Measure the disc thickness with calipers or a micrometer.

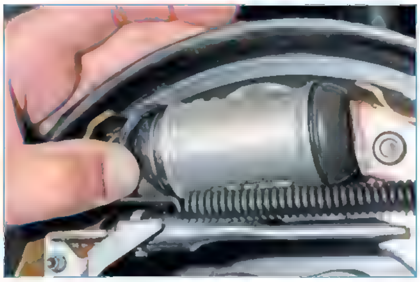
Before measuring with a caliper, remove with a file or other method the burrs formed on the maximum diameter of the disc on both sides due to wear, as they interfere with making an accurate measurement.

To check the condition and wear of the rear-wheel brake pads and drums, remove the drums (see “ Replacing the rear-wheel brake pads”, p. 228).

Measure the thickness of the pad with a caliper. If the pad thickness (lining together with the backing) is less than 5 mm, the pads on both brake mechanisms must be replaced. Inspect the drums; there must be no cracks or chips. With high vehicle mileage...



...measure the drum's inner diameter with a caliper.
If the working surface is severely worn (maximum permissible inner drum diameter 204.25 mm), or if there are deep grooves, replace the brake drum. With the drums removed, check the condition of the wheel cylinder sealing boots. To do this...



...pull the edge of the dust cover away from the protrusion on the cylinder housing.

If brake fluid is present under the dust cover, indicating a faulty boot, the cylinder must be replaced.

On vehicles without ABS, inspect the pressure regulator in the rear wheel brake mechanisms and its actuator. The regulator and actuator must not be damaged, and leaking brake fluid from the regulator or brake lines is not permitted. The regulator piston must not be seized — when the brake pedal is pressed, the regulator piston rod should act on the actuating lever (see "Brake system", p. 221).

To check the operation of the vacuum brake booster with the engine off, press the brake pedal 5–6 times and, holding it depressed, start the engine. With a functioning vacuum booster, the pedal should move slightly forward after the engine starts. If this does not happen or braking is insufficiently effective (the brake pedal must be pressed with great force), check the tightness of the vacuum hose connections to the booster and the condition of the booster itself.

Inspect the condition of the brake lines. The lines should be securely fastened in their clips and must not have dents, mechanical damage, heavy corrosion, or signs of brake fluid leakage. If necessary, tighten the connecting fittings or replace faulty parts. Brake hoses must not have cracks, ruptures, or abrasions. Check each hose by creating pressure in the brake system: an assistant should press the brake pedal firmly and hold it during the inspection. Bulging of the rubber or leakage of brake fluid from a hose or its fittings is unacceptable. If any damage is found, replace the hoses as a set.

Checking the operation of the parking brake. Full travel of the lever

The parking brake lever should have between 6 and 8 clicks of the ratchet mechanism. If necessary, adjust the parking brake (see " Adjusting the parking brake linkage", p. 236).

Inspection of the chassis and drivetrain

Inspect the chassis and drivetrain every 15,000 km of driving.

Components of the chassis (wheels, suspension arms, anti-roll bar, front suspension subframe, rear suspension beam, shock absorbers and suspension springs) and the drivetrain (front drive shafts) must not show deformation, cracks, or other mechanical damage that affects the shape or strength of the parts. With the front and rear wheels suspended in turn (the vehicle must be securely supported on stands), check the condition of the wheel hub bearings.

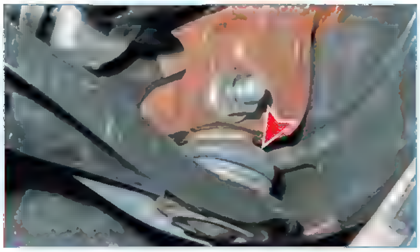
! **Use only manufacturer-made stands.**

The wheel should rotate smoothly by hand, without sticking or knocking.

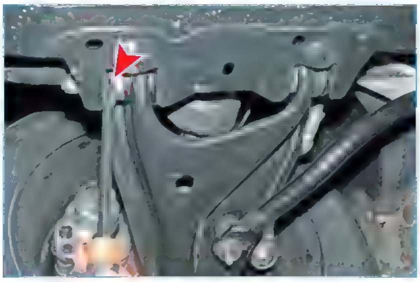
Grasping the wheel in the vertical plane, alternately jerk the top part of the wheel toward yourself and the bottom part a way from you, and then vice versa.

Check for any play (knock). If there is a knock at the front on the wheel, ask an assistant to press the brake pedal. If the knock disappears, the hub bearing is defective; if the knock remains, the ball joint is most likely worn. Front and rear wheel hub bearings are not adjustable and must be replaced if there is any play. To check the condition of the ball joint, insert a pry bar between the eye of the steering knuckle (where the ball joint stud fits) and the suspension arm.

By prying the arm away from the steering knuckle with a large screwdriver or a pry bar, observe the movement of the ball joint housing relative to the steering knuckle ear. If there is play in the joint, replace the ball joint.

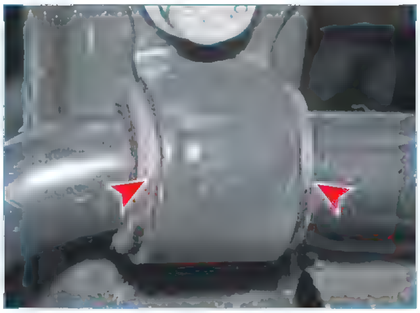


We check the condition of the protective boots of the front suspension ball joints. Ball joints with torn or cracked boots are replaced. To inspect the front suspension control arm's bushing...



...alternately insert the pry bar wedged between the subframe using a pry bar and the end of the bushing's outer sleeve on one side, and the subframe and the control arm head on the other side of the bushing...

...and try to move the head of the tie rod push the bushing along the bolt axis first in one direction, then in the other. If the lever head moves freely, without effort, then the lever's silent block is heavily worn or damaged and must be replaced. Tears, cracks, and swelling of the silent block's rubber sleeve are unacceptable. Similarly check the condition of the other lever silent block.

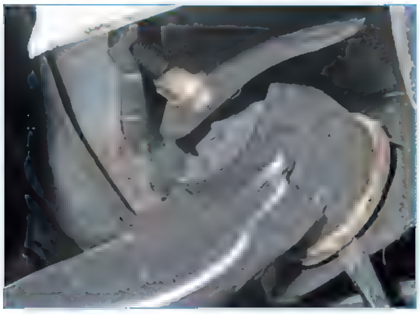


Inspect the stabilizer bar bushings for lateral stability. If you find tears, cracks, or severe deformation in the rubber bushings, they must be replaced.

Grasp the stabilizer bar by hand near its attachment point to the arm...

...snap the bar up and down sharply. If you detect play in the connection between the stabilizer bar and the front suspension arm, replace the rubber sleeves on the bolt that secures the bar to the arm.

To check the condition of the silent block of the rear suspension beam arm...

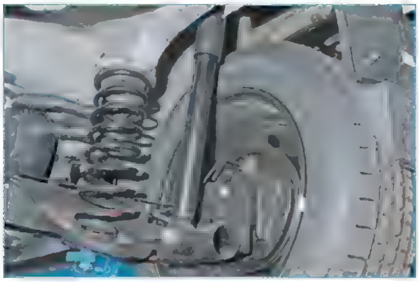


...insert a trim lever wedged between the body bracket and the end of the outer hinge sleeve and try to push the control arm head along the bolt axis.

If rubber tears or delamination of the joint are found,

replace the bushing.
Check the condition of the springs and shock absorbers...

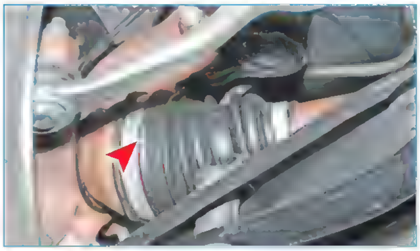
...of the front...



...and rear suspensions.

The suspension springs must not have damage. Tears, cracking, and severe deformation of rubber bushings, mounts, and shock absorber bump stops are unacceptable. Leakage of fluid from the shock absorbers is not permitted. Minor " sweating" of the upper part of a shock absorber while its characteristics remain intact is not a malfunction.

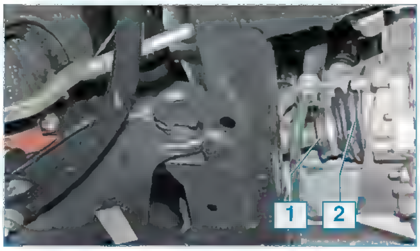
the upper part's damage while retaining functionality is not considered a malfunction.
By alternately rotating and turning the front wheels...



...inspect the protective boots of the outer...

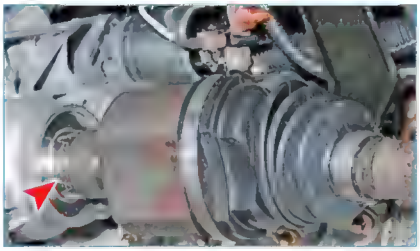
...and the inner joints of the front-wheel drives, checking the security of their attachment with clamps. Cracked, torn, or hardened boots must be replaced.

The inner joint boot of the left wheel drive must be sealed tightly to the transmission housing.



Oil leakage from the gearbox through boot 1 and the oil seal 2 of the inner joint of the left wheel drive is not permitted.

Checking for absence of oil leakage from the gearbox...

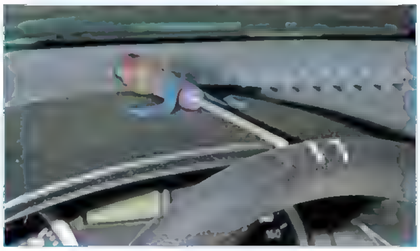


...through the seal of the inner joint housing of the right wheel drive. If leakage is present, replace the seal.

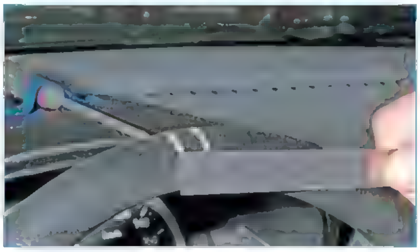
Inspection of condition steering system

We inspect the condition of the steering system every 15,000 km mileage. On the steering components the left control must have no mechanical damage.
Perform the work over an inspection pit or on a ramp.
To check the free play of the steering wheel (steering play), set the front wheels to the position corresponding to straight-line driving. Attach tape to the instrument panel to

Insert a long-shaft screwdriver so its blade is directed toward the steering wheel. Turn the steering wheel until the start of the turn—
of the wheels (the wheels should remain stationary) first to one side, then to the other.



At the moments when the wheels begin to turn, mark the limits of the steering wheel free play on its rim with chalk or thread.



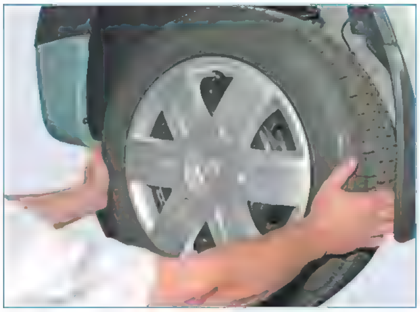
Measuring the distance between the marks...

...determine the steering wheel free play, which must not exceed 5° (equivalent to a 15 mm steering wheel movement) provided the steering mechanism, tie rods, hub bearings of the front wheels, and telescopic struts are in good condition.

tie rods, hub bearings of the front wheels, and telescopic struts.
When sharply turning the steering wheel from side to side by a small angle, check for absence of knocking in the universal joints of the steering column and the steering gear. If knocking is present, tighten the...

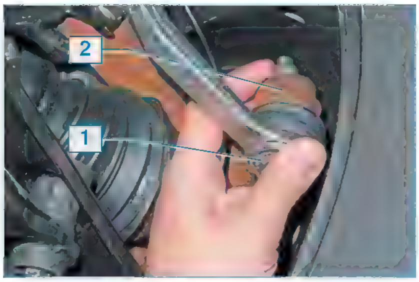
are loosened, the mounting brackets of the steering control elements or replace faulty parts and units.

An assistant is required to assess the condition of the ball joints of the tie-rod ends. Raise the front wheels and securely support the vehicle on manufacturer-made stands.



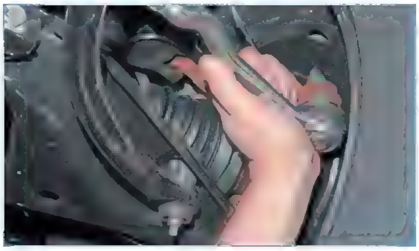
The assistant, holding the wheel, rocks it in the horizontal plane — several times alternately sharply pulls the rear of the wheel toward themselves and the front away, and vice versa.

Meanwhile, placing a hand...



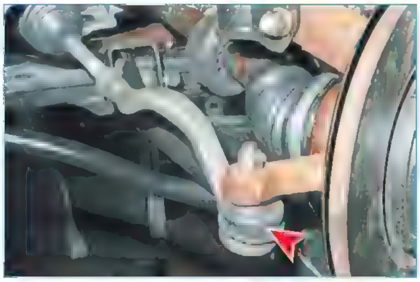
...on the housing of the ball joint 1 of the tie-rod end and on the steering knuckle arm 2, we assess their relative movement.

If free play is felt in
in the ball joint, it is necessary to replace the tie-rod end.

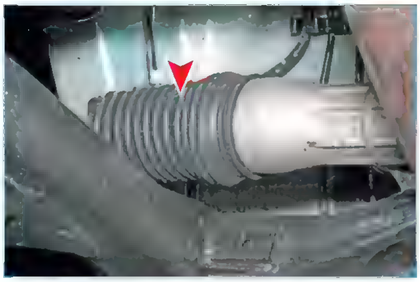


Then apply force from bottom to top to the ball joint housing of the tie-rod end along the axis of the joint pin.

With a serviceable tie-rod end, the joint housing should move relative to the joint stud by 1.5–2.0 mm. This indicates that the stud bushing is not jammed in the joint housing bore and can move, compressing the joint spring. A tie-rod end with a jammed joint bushing should be replaced. The tie-rod end should also be replaced...



...if the joint boot of the tie-rod end is torn, cracked, or has lost its elasticity.



Check the condition of the steering mechanism boots.

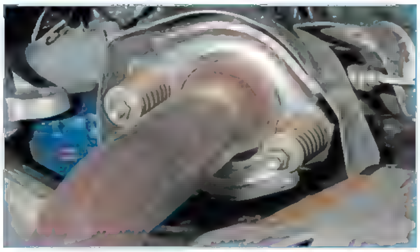
If the boots have lost their elasticity, cracked, or torn, they must be replaced.

System check and exhaust gases

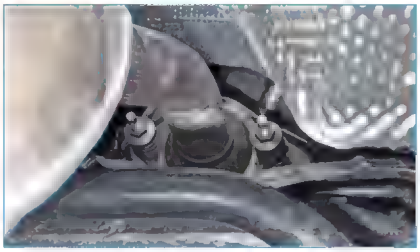
систе We уск erfo

We inspect the condition of the exhaust system every 15,000 km of driving. The work is carried out on an inspection pit or ramp.

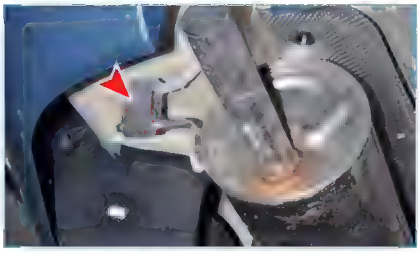
We check and, if necessary, tighten the mounting of the intake pipe to the exhaust manifold...



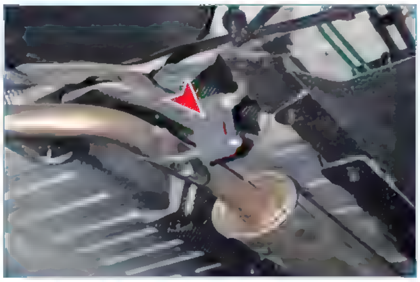
...on 1.4–1.6 (8V) engines...



...and on the 1.6 (16V) engine. We check the condition of the rubber suspension mounts...



...of the main silencer...



...and on the pipe behind the additional muffler.

On cars with 1.4–1.6 (8V) engines, another mount is installed in front of the catalytic converter. Inspect the pipes and components of the exhaust system. If there is through corrosion or mechanical damage, the defective part must be replaced.

Fault diagnosis

Engine and Its Systems

List of Possible Faults	Diagnostics	Remedy Method
CRANKSHAFT DOES NOT TURN WITH STARTER		
The battery is discharged	Voltage at the battery terminals with consumers switched off below 12 V. Charge the battery; if it does not charge — replace it. The engine can be started by jump-starting from another vehicle's battery; a crackling noise may be heard from under the hood when the starter is engaged.	
Reduced capacity of the battery	Voltage at the battery terminals with consumers switched off above 12 V, but when the starter is engaged it drops to 6–8 V. Charge the battery with a small current (no more than 1 A); if the capacity is still insufficient, replace the battery. The engine can be started by jump-starting from another vehicle's battery; a crackling noise may be heard from under the hood.	
Corrosion on the battery terminals and wire clamps, loose connections	When the starter is engaged, the voltage in the on-board network drops far more than at the battery terminals. At the same time, cracking noises may come from under the hood	Tighten the clamps, clean the contact surfaces and lubricate them with technical petroleum jelly
Seizure of the engine or attached units	Check whether the engine crankshaft, the coolant pump pulley, the alternator, and the power steering pump are turning	Repair the engine CTO, replace the coolant pump, alternator, or power steering pump
The starter drive gear or the flywheel ring gear teeth are damaged	Inspect after removing the starter	Repair or replace the starter; replace the flywheel
Starter engagement circuit malfunction: When turning the ignition key to position IV, the starter solenoid does not engage (no click under the hood). The F1 (60 A) fuse may have blown, ignition switch contacts may be damaged, or wires may be open or shorted. Check whether +12 V is present at the control terminal of the starter solenoid		Replace faulty components: wires, fuse, ignition switch
Starter solenoid fault: winding short or open circuit, stuck or misaligned relay armature, contaminated surfaces, corrosion, etc. When turning the key to position IV the solenoid does not operate (no click under the hood), yet +12 V is present at the solenoid control terminal. Remove the relay and check its operation		Replace the faulty pull-in relay
Contacts of the pull-in relay or wires are oxidized, poor ground connection	When the starter is engaged, a click is heard under the hood but the starter armature does not turn. Check the resistance of the "battery–starter" circuit with an ohmmeter, including the ground wire. If the circuits are intact, remove the starter and test the pull-in relay by powering it directly from the battery	Clean and tighten the wire terminals. Replace the faulty pull-in relay
Open or short in the holding winding of the pull-in relay When the starter is engaged, a crackling sound is heard from under the hood. Battery voltage is within normal range. An open or short in the holding winding of the pull-in relay can be checked with an ohmmeter or by its excessive heating		Replace the starter pull-in relay
Burning of the starter commutator, seized brushes or their severe wear	The starter armature does not turn or turns slowly. At low rotational speed, first make sure the pull-in relay is functioning; you can apply power directly to the starter's terminal bolt from the battery, bypassing the relay	replace worn components of the starter

List of Possible Faults	Diagnostics	Remedial Method
Open circuit or short circuit in the armature winding starter	The starter armature does not turn or turns slowly. First make sure the pull-in relay is functioning; to do this, you can supply power to the starter's terminal bolt, bypassing the relay. The winding condition is checked with an ohmmeter or by observing insulation darkening.	Replace the armature or the starter.
Slipping of the overrunning clutch хода	When the starter is engaged, the armature turns, the flywheel remains stationary.	Replace the clutch or the starter.
LOUD NOISE WHEN STARTER IS RUNNING		
The starter is mounted on the clutch housing with a misalignment, its mounting has loosened, or the cover on the drive side is broken	Inspection	Tighten the starter mounting bolts to the clutch housing; if the cover is broken, replace the starter
Excessive wear of bearing bushings or armature shaft journals	Inspection after disassembling the starter	Replace the starter
The ring gear is turning on the flywheel	When the starter is engaged, the ring gear rotates while the flywheel and crankshaft remain stationary. A squeal or howl is heard from the clutch housing side	Replace the flywheel
Worn teeth on the starter drive gear or (more commonly) on the flywheel ring gear	Inspect after removing the starter	Replace the drive gear, starter, or flywheel
The gear does not disengage with the flywheel: sticking drive lever, weakened or broken freewheel clutch spring or starter pull-in relay spring, sticking clutch on the shaft splines or on the pull-in relay armature, faulty ignition switch (ignition switch contacts do not open)	Check whether voltage is removed from the control terminal of the starter solenoid when the ignition key is released, and whether the key returns to position “III”. You can check ignition switch contact opening with an ohmmeter. If the voltage to the starter solenoid disappears when the ignition is turned off, remove and disassemble the starter for inspection	Replace the starter solenoid or the complete starter assembly, or the ignition switch
CRANKSHAFT TURNS WITH STARTER BUT ENGINE DOES NOT START		
There is no fuel in the tank	By the fuel level gauge and the low-fuel warning reserve fuel indicator	Add fuel
The battery is discharged	The crankshaft turns with the starter very slowly. The battery terminal voltage with consumers switched off is below 12 V	Charge the battery; if it does not charge, replace it. The engine can be started by "jump-starting" from another vehicle's battery
Reduced capacity of the battery	The crankshaft turns very slowly. Charge the battery with a small current (less than 1 A); if the capacity is still insufficient, replace the battery. With the consumers switched off, the battery terminal voltage is above 12 V, but when the starter is engaged it drops to 6–8 V. The engine can be started by "jump-starting" from another vehicle's battery	
Oxidation of the clamp terminals on the battery posts or loose connections The crankshaft turns very slowly. When the starter is engaged, the voltage in the onboard electrical system drops much more than at the battery terminals		Tighten the terminals, clean the contact surfaces, and lubricate them with technical vaseline
Unreliable connection of the electrical circuits of the engine control and power supply systems	Check the connections of the electrical harness connectors and the security of contacts in the wire terminal blocks	Eliminate the fault in the connector connections

List of possible faults	Diagnostics	Remedial method
Increased resistance to crankshaft rotation: scoring on shafts, bearing shells, and piston-cylinder assembly parts; shaft deformation; congealed engine oil; seized alternator, coolant pump, or power steering pump	The crankshaft turns with the starter very slowly. If the weather is cold and the engine ran smoothly and without unusual noises the day before, it is likely Most likely the cause of increased resistance to rotation is congealed oil. In this case, try starting the engine using another battery. After starting, avoid running the engine at high RPM and watch the low oil pressure warning light: if it comes on, immediately stop the engine for 1–2 minutes to allow the thickened oil to drain back into the oil pan. If unusual noises are heard during starting or operation, check that the pulleys of the alternator, coolant pumps, and power steering pump rotate freely.	If there are abnormal noises in the area of the block or cylinder head, have the engine repaired. Use CTO - motor oil appropriate for the climatic conditions. Replace the alternator, coolant pump, and power steering pump.
Ignition system malfunction	Check for spark at the spark plugs. Inspect the system circuits and components for ignition faults. If there is no spark, the cause may be failures in low-voltage devices and circuits (ECU, primary winding of the ignition coil) or high-voltage components (secondary winding of the ignition coil, high-voltage wires). Replace the faulty device and wires. Ensure contact in the electrical circuits.	
High-voltage wires connected to the ignition coil in the wrong order; a wire has come loose	Inspection	Connect the wires according to the markings on the ignition coil
Timing belt is broken or belt teeth are sheared off	While turning the crankshaft, check the movement of the valve train components through the oil filler neck opening	Repair the engine CTO
Defective spark plugs	Check for spark at the spark plugs	Replace the spark plugs
Valve timing is incorrect	Check the valve timing	Set the correct relative position of the shafts. Check the compression
ECU, its circuits, or the sensor are faulty of the crankshaft position sensor	Check whether +12 V is supplied to the ECU, the crankshaft position sensor circuit, and that the sensor itself is not damaged	Replace the faulty: fuse F4 (5A), ECU, sensor, wiring
Fuse F3 (25A) has blown engine management system	Check the engine management system fuse	Eliminate the cause of the fuse blowing the protector—replace it
Main relay K6 and relay K5 are faulty of the fuel pump, the pump power circuit or the pump itself	When the ignition is turned on, the sound of the pump running is not heard. Apply power directly from the battery to the terminals pump	Clean the contacts, crimp the wire terminals, replace the faulty relay, relay, pump
Fuel filter clogged, water in the fuel system frozen, wa- fuel lines formed	When the crankshaft is turned by the starter, there is no smell of gasoline from the exhaust pipe	Replace the fuel filter. In winter, move the vehicle into a warm garage and blow out the fuel lines.
The fuel pump does not create the required pressure in the system	Check the pressure in the fuel system. Clean the mesh filter of the fuel module; ensure the mesh filter of the fuel module is clean. Replace the faulty fuel pump or fuel pressure regulator	
Injectors or their power circuits are faulty	Check the injector windings with an ohmmeter. Replace faulty injectors, insulation and electrical circuits (check for open circuits and short circuits in the electrical circuits).	

Fault diagnosis

List of possible faults	Diagnostics	Remedy
Intake of foreign air into the intake tract	Inspect the joints, check the fit of the throttle assembly, the absolute pressure and air temperature sensors. Temporarily disconnect the vacuum booster by disabling the brake vacuum booster and plug the intake manifold port of the receiver. Torn gaskets, sealing rings, parts with deformed flanges, or a faulty vacuum booster — replace.	

ENGINE RUNNING IDLES UNSTEADILY OR STALLS AT IDLE

Unreliable electrical connections in the control and power systems. Check the electrical connections of wiring harness connectors, and the security of wire terminal connections in the plugs.		Repair faulty connections in the connectors.
The gap between the spark plug electrodes does not meet the specification	Check the gaps	Set the correct gap or replace spark plugs
Heavy carbon deposits on the spark plug electrodes; carbon particles entering the gap between the electrodes	Inspection	Check and, if necessary, replace the spark plugs
Faulty spark plugs: current leakage through cracks in the insulator or over carbon deposits on the heat shield, poor contact at the center electrode	No external damage and no arcing between the electrodes on the removed spark plug does not allow a conclusion about its operability	Replace the spark plugs
Damage to the insulation of high-voltage devices and circuits. Check with an ohmmeter for an open circuit or "breakdown" (short to ground)	"Breakdown" (short to ground) of the ignition coil winding, high-voltage wires	Replace the damaged ignition coil and high-voltage wires
The valve timing phases are disturbed	Check the valve timing	Set the correct relative alignment of the shafts. Check the compression
Low compression in the engine cylinders (less than 11.0 bar): wear or damage to the valves, their guide bushings and seats, sticking or breakage of piston rings	Check the compression	Replace the defective parts CTO
Faulty: absolute pressure and intake air temperature sensors, throttle position sensor, fuel injectors (coil open or short, nozzles heavily clogged)	Check the absolute pressure and intake air temperature sensors, the throttle position sensor and the injectors. Check injector operation and the electrical circuits	Replace faulty sensors, wiring, and injectors. Contaminated injectors can be cleaned on a specialized bench. CTO
The idle speed control valve or its circuits are malfunctioning.	Replace the regulator with a known-good unit.	Replace the defective regulator.
Air intrusion into the intake tract.	Inspect the joints and check the fit of the throttle assembly, the absolute pressure sensor, and the air temperature sensor. For starting, disable the brake vacuum booster by blocking the fitting of the intake pipe to the receiver.	Replace torn gaskets, sealing rings, parts with deformed flanges, and a faulty vacuum booster.
Fuel pressure regulator faulty fuel	Check the pressure in the fuel system with a gauge.	Replace the fuel module.
Faulty charcoal canister; leak at the connections of the fuel vapor capture system hoses	Inspect the charcoal canister for damage and check the tightness of its connections	Replace the faulty canister and hoses. Repair any connection leaks
Sticking throttle valve or its actuator. In this condition the ECU does not regulate idle engine operation	Check that the throttle valve moves freely	Adjust the actuator and the throttle valve position. Replace the throttle assembly.
The oxygen concentration sensor is faulty.	Assess the oxygen concentration sensor's functionality and the integrity of its electrical connections using diagnostic equipment. CTO	Repair the damaged electrical circuits. Replace the faulty sensor.

List of possible faults	Diagnostics	Remedial method
Camshaft cam wear	Inspection after partial engine disassembly	Replace the camshaft CTO
Valve train clearances not adjusted valves	Check the clearances	Adjust the clearances
Lever arm hydraulic lifters are faulty panov	Check the hydraulic supports	Replace the faulty hydraulic supports
The vehicle speed sensor is faulty биля	After stopping the vehicle, the engine runs unevenly, but the idle speed soon stabilizes	Replace the vehicle speed sensor
THE ENGINE DOES NOT DEVELOP FULL POWER; THE VEHICLE LACKS SUFFICIENT ACCELERATION. JERKS AND POWER DROPS WHILE THE VEHICLE IS MOVING		
Replaceable air filter element is clogged	Check the condition of the replaceable element of the air filter	Blow out or replace the replaceable air filter element
Increased resistance to gas flow in the exhaust system	Inspect the exhaust system for crushed or damaged pipes; check the condition of the catalytic converter (backpressure) CTO	Replace damaged components of the exhaust system
Intake of foreign air into the intake tract	Inspect joints, check the fit of the throttle assembly, manifold absolute pressure and intake air temperature sensors. For a short time, disable the vacuum brake booster by capping the receiver vacuum line. Replace gaskets, sealing rings, parts with deformed flanges, and a faulty vacuum brake booster	
Incomplete opening of the throttle valve throttle plates	Visually determined with the engine stopped	Adjust the throttle drive throttle plates
Low compression in the engine cylinders (less than 11.0 bar): wear or damage to valves, their guide bushings and seats, sticking or breakage of piston rings	Check the compression	Replace defective parts CTO
The valve timing phases are incorrect	Check the valve timing phases	Set the shafts to the correct relative positions. Check the compression
The spark plug electrode gaps do not meet the specification	Check the gaps	By bending the side electrode, set the required gap or replace the spark plugs
Heavy carbon deposits on the spark plug electrodes; particles of carbon entering the gap between the electrodes	Inspection	Check and, if necessary, replace the spark plugs
Damage to the insulation of high-voltage components and circuits	Check the ignition coil winding for an open circuit or "break" with an ohmmeter a short to ground (short circuit) of the ignition coil winding, high-voltage wires	Replace damaged ignition coil, high-voltage wires
There is not enough fuel in the tank	According to the fuel level gauge and the low-fuel warning light	Refill with fuel
Fuel filter clogged, water that entered the fuel system has frozen, fuel lines are deformed	Check the pressure in the fuel system	Replace the fuel filter. In winter, move the vehicle into a warm garage and blow out the fuel lines. Replace defective hoses and tubes
Fuel pump does not generate the required pressure in the system	Check the pressure in the fuel system; ensure the mesh filter of the fuel module is clean	Clean the mesh filter of the fuel module. Replace faulty fuel pump and pressure regulator
Poor contact in the fuel pump power circuit (including "ground" wires)	Check with an ohmmeter	Clean the contacts, crimp the wire terminals, replace any faulty wires

List of possible faults	Diagnostics	Remedial method
Injectors or their circuits are faulty	Check the injector windings and their circuits with an ohmmeter (no open circuits or short circuits)	Replace the faulty injectors; ensure contact in the electrical circuits
The intake air temperature sensor or its circuits are faulty or its circuits	Check the sensor and its circuits	Restore contact in the electrical circuits; replace the faulty sensor
The absolute air pressure sensor or its circuit is faulty— or its wiring	The functionality of the absolute air pressure sensor can be assessed— of intense air pressure can be achieved using diagnostic equipment CTO	Restore the connections in the electrical circuits; replace the faulty sensor
Oxygen concentration sensor malfunctioning	Assess the sensor's operation The oxygen concentration sensor and the integrity of its circuit connections can be evaluated using diagnostic equipment CTO	Repair the damaged circuits. Replace the faulty sensor
ECU or its circuits malfunctioning	To test the ECU, replace it with a known good unit operational	Replace the faulty ECU
Valve train clearances are not adjusted valves	Check the valve train clearances	Adjust the valve train clearan- HOB
Hydraulic supports of the control levers are faulty— lever arms	Check the hydraulic supports	Replace the faulty hydraulic supports
Severe wear of the camshaft cams— of the camshaft	Inspection during engine disassembly CTO	Replace the worn distributor- camshaft CTO
Sagging or breakage of valve springs	Inspection during engine disassembly CTO	Repair the engine CTO
Throttle position sensor or its circuit is faulty of the throttle valve	Check the throttle position sensor	Restore contact in the electrical circuits, replace the faulty sensor
Temperature sensor is faulty cooling of the liquid	Check the sensor's resistance with a tester at different temperatures	Restore the contact in the electrical circuits, replace the faulty sensor
PULSES IN THE INTAKE PIPELINE		
Clearances in the drive are not adjusted valves	Check the valve train clearances	Adjust the valve train clearances
The hydraulic lifters of the levers are faulty valves	Check the hydraulic lifters	Replace the faulty hydraulic supports
Intake valves stick in the guide bushings: tarry deposits on the valve stem or bushing surface, wear, or broken valve springs	Inspect during engine disassembly CTO	Repair the engine CTO
Valve timing is disturbed	Check the valve timing	Set the correct relative positioning of t he crankshaft and camshaft. Check the compression
POPPING IN THE MUFFLER		
Valve train clearances are not adjusted valves	Check the valve train clearances	Adjust the valve train clearances HOB
Hydraulic supports of the valve lever are faulty	Check the hydraulic supports	Replace the faulty hydraulic supports
Exhaust valves stick in the bushings: wear of the valve stem or bushing, seating or breakage of the valve springs	Inspection during engine disassembly CTO	Repair the engine CTO
Valve timing phases are incorrect	Check the valve timing phases. Set the correct relative positions of the shafts. Check compression.	

List of possible faults	Diagnostics	Remedy
Spark plugs are defective: current leakage through cracks in the insulator or along carbon deposits on the thermal cone, poor contact of the central electrode	Plugs are tested on a special bench. Lack of external damage and spark formation between the electrodes on a removed plug do not allow one to conclude that it is functional	Replace the spark plugs
Damage to the insulation of high-voltage devices and circuits — interruptions in spark formation	Check with an ohmmeter for an open circuit or a "short to ground" (shorting to "earth") of the winding	Replace the faulty ignition coil, damaged high-voltage ignition coils, high-voltage wires (when disconnecting a wire, pull it by its terminal). Under severe operating conditions, it is advisable to replace the wires every 3–5 years
Fuel injectors malfunctioning	Check the injectors	Replace faulty injectors
INCREASED FUEL CONSUMPTION		
The replaceable air element is clogged filter	Check the condition of the replaceable air filter element	Blow out or replace the replaceable element of the air filter
Fuel system leakage	Smell of gasoline, fuel drips	Check the tightness of the fuel system component connections; if a fault is found, replace the corresponding assemblies
Faulty spark plugs: current leakage through cracks in the insulator or along carbon deposits on the heat cone, poor contact of the central electrode	Spark plugs are tested on a special bench. The absence of visible damage and sparking between the electrodes on a removed plug does not allow a conclusion about its operability	Replace the spark plugs
Throttle actuator malfunction valve	Check the throttle pedal travel, the clearance in the linkage (pedal free play), replace faulty parts, ensure there is no cable or pedal sticking	lubricate with engine oil linkage, cable
The idle speed control valve or its circuits are faulty	Replace the valve with one that is known to be working	Replace the faulty valve
The throttle does not close completely.	When held up to the light, a gap is visible between the throttle plate and the walls of the housing	Replace the throttle assembly
High pressure in the fuel line due to a faulty pressure regulator	Check the pressure in the fuel system with a pressure gauge	Replace the fuel module
Leaking injectors	Inspect the injectors	Replace the faulty fuel injectors
The engine coolant temperature sensor or its circuits are faulty	Check the sensor resistance with an ohmmeter at different temperatures	Restore the electrical circuit contact; replace the defective sensor
The oxygen concentration sensor is faulty	Assess the oxygen sensor's functionality and the reliability of its electrical connections using diagnostic equipment	Restore the damaged electrical circuits, replace the faulty sensor
The ECU or its circuits are faulty	To check, replace the ECU with one that is known to be working	Replace the faulty ECU, restore the damaged electrical circuits
Low compression in the engine cylinders (less than 11.0 bar): valve train clearances not adjusted, hydraulic valve lifters faulty, wear or damage to valves, their guide bushings and seats, sticking or breakage of piston rings	Check the compression	Adjust the clearances in the valve drive. Replace faulty parts
The throttle position sensor, the manifold absolute pressure sensor, the intake air temperature sensor, or their circuits are malfunctioning	Check the sensors and their circuits	Restore contact in the electrical circuits; replace the faulty sensor(s)

List of Possible Faults	Diagnostics	Remedial Method
Increased resistance to gas flow in the exhaust system	Inspect the exhaust system for dented or damaged pipes and check the condition of the catalytic converter. Replace any damaged components of the exhaust system.	
Chassis and brake system malfunctions	Inspect the chassis components and the brake system	Adjust wheel alignment angles, replace faulty chassis parts, and repair any defects in the brake system

INCREASED OIL CONSUMPTION (MORE THAN 500 G PER 1,000 KM)

List of Possible Faults	Diagnostics	Remedial Method
Oil leaks from: crankshaft and camshaft seals; oil pan and cylinder head gaskets; oil pressure sensor; oil filter sealing ring	Wash the engine, then after a short-run бthoroughly inspect areas that may й be leaking	Tighten the fasteners of the cylinder head, cylinder head cover, and oil sump; replace worn oil seals and gaskets
Wear, loss of elasticity of the oil-splash caps (valve stem seals). Wear of valve stems and guide bushings	Inspection of parts during engine disassembly	Replace worn parts
Wear, breakage, or coking (loss of mobility) of piston rings. Wear of pistons, cylinders	Inspection and measurement of parts after engine disassembly	Replace worn pistons and rings Rebore and hone the cylinders
Use of oil with incorrect viscosity	—	Replace the oil
Crankcase ventilation system is clogged	Inspection	Clean the ventilation system

DETONATION (HIGH-PITCHED METALLIC KNOCKS ARISING, USUALLY WHEN THE ENGINE IS UNDER LOAD, ESPECIALLY AT LOW RPM, FOR EXAMPLE, ACCELERATION "SN APING" ETC., AND DISAPPEARING WHEN THE LOAD IS REDUCED)

List of Possible Faults	Diagnostics	Remedial Method
Fuel with an unacceptably low octane rating	—	Refuel the vehicle with the fuel recommended by the manufacturer
Engine overheating	By the coolant temperature gauge	Eliminate the cause of overheating (see below “Engine overheats”)
Excessive carbon deposits in the combustion chambers, on piston crowns, and on valve faces	Inspection after removing the cylinder head	Eliminate the cause of carbon buildup (see "Increased fuel consumption", "Increased oil consumption"). Use an oil of the recommended viscosity and, if possible, low ash content
Spark plugs with an incorrect heat range are being used	—	Use spark plugs recommended by the manufacturer

LOW OIL PRESSURE (OIL PRESSURE WARNING LAMP IS ON)

List of Possible Faults	Diagnostics	Remedial Method
Low engine oil level	Check the oil level gauge	Add oil
Oil filter malfunction	Replace the filter with a known-good one	Replace the faulty oil filter
The mounting bolt of the auxiliary drive pulley has loosened	Check the bolt torque	Tighten the bolt to the specified torque
Clogging of the oil pickup screen	Inspection	Clean the screen
Misalignment, clogging of the oil pump relief valve, or weakening of the valve spring	Inspection during disassembly of the oil pump	Clean or replace the faulty relief valve. Replace the pump
Wear of the oil pump gears	Determined by measuring the parts after disassembling the oil pump	Replace the oil pump
Excessive clearance between bearing shells and crankshaft journals	Determined by measuring parts after engine disassembly	Replace worn bearing shells. If necessary, replace or repair the crankshaft

List of Possible Faults	Diagnostics	Remedy
Insufficient oil pressure sensor faulty oil pressure	Unscrew the low oil pressure sensor from the cylinder head opening and install a known-good sensor in its place. If the warning light goes out while the engine is running, the removed sensor is defective.	Replace the defective low oil pressure sensor.
ENGINE OVERHEATING (ENGINE OVERHEAT WARNING LIGHT IS ON)		
Thermostat malfunctioning	Check the thermostat for proper operation.	Replace the faulty thermostat.
Insufficient amount of coolant	Coolant level below the MIN mark in the expansion tank	Repair leaks. Refill the coolant
Excessive scale in the cooling system	—	Flush the cooling system with a descaling agent. Do not use hard water i n the cooling system. Dilute concentrated antifreeze only with distilled water
Radiator fins clogged	Inspection	Flush the radiator with a high-pressure water jet
Coolant pump malfunction—ing	Remove the pump and inspect the assembly	Replace the pump assembly
Cooling system fan does not turn on—cooling	Check the fan activation circuits	Restore contact in the electrical circuits. Replace any faulty fuse, relay, cooling system fan, temperature sensor, or ECU
Unacceptably low octane rating gasoline	—	Refuel the vehicle with fuel recommended by the manufacturer
Excessive carbon buildup in the combustion chambers, on the piston crowns, and on the valve faces	Inspection after removing the cylinder head of the engine cylinders CTO	Eliminate the cause of carbon buildup (see “Increased fuel consumption,” “ Increased oil consumption”). Use oil of the recommended viscosity and, if possible, with low ash content
Exhaust gas leak into the cooling system through a damaged cylinder head gasket	You can feel exhaust gas bubbles in the expansion tank. Replace the cylinder head gasket. Check the cylinder head and block for warpage	CTO
FAN RUNNING	**FAN OF THE COOLING SYSTEM IS MELTING (EVEN WHEN THE ENGINE IS COLD)**	**ENGINE FAILURES**
Open circuit in the engine coolant temperature sensor or its wiring	The sensor and wiring are checked with an ohmmeter	Restore the connection in the electrical circuits. Replace the faulty sensor
Fan relay contacts do not open	Tested with a tester	Replace the faulty relay
The ECU or its circuits are faulty	Check the ECU CTO or replace the unit—with a working one	Replace the faulty ECU
ENGINE TAKES A LONG TIME TO WARM UP TO OPERATING TEMPERATURE		
Thermostat malfunction	Check the thermostat for proper operation	Replace the faulty thermostat
Low ambient temperature (below –15 °C)	—	Insulate the engine: cover the opening in the front bumper with a windproof material
COOLANT LEVEL DROP IN THE EXPANSION TANK		
Damage to the radiator, expansion tank, hoses, or loosening of their fittings on the pipes	Inspection. The tightness of the radiators (engine and heater) is checked in a bath with water using compressed air at a pressure of 1 bar	Replace damaged parts
Coolant leakage through the pump seal	Inspection	Replace the pump

List of possible faults	Diagnostics	Remedy
Damaged cylinder head gasket. Defect in the block or cylinder head	Oil level gauge shows an emulsion with a whitish tint. Heavy exhaust smoke and oil spots on the coolant surface (in the expansion tank) may occur. Coolant leakage on the engine surface	Replace damaged parts CTO. Do not use water in the cooling system; fill with coolant appropriate for the climatic conditions
UNUSUAL NOISES AND KNOCKING IN THE ENGINE		
Valve clearances in the drive are not adjusted valves	Check the clearances	Adjust the clearances
Lever hydraulic supports are faulty— panels	Check the hydraulic supports	Replace the faulty hydraulic supports
Sagging or breakage of valve springs	Inspection during engine disassembly CTO	Repair the engine CTO
The timing belt of the valve drive is worn. The tensioner or idler pulley is faulty	Inspection	Replace the belt. Replace the faulty tensioner or idler pulley of the valve drive
Wear of bearings and cam lobes of the camshaft, connecting-rod and main bearings of the crankshaft, pistons, piston pins, play or seizure in the bearings of auxiliary units	Check	Repair or replacement of parts CTO
One or several engine mounting supports have lost elasticity or are damaged	Inspection	Replace the mount
Low oil pressure in the lubrication line (at minimum engine idle speed, oil pressure in the lubrication system of a warmed-up engine should be at least 1.0 bar)	Check the oil system pressure. Pressure can be measured by connecting a gauge to the oil line, removing the oil pressure sensor	Repair faults in the lubrication system
Wear of the oil pump drive chain	Check the chain tension after removal of the oil pan	Replace the oil pump drive chain
SEVERE ENGINE VIBRATION		
Uneven compression across cylinders more than 2.0 bar: valve drive clearances are not adjusted, hydraulic lifters are faulty, valves or seats are worn or damaged; piston rings are worn, stuck, or broken	Check the compression. Compression must be at least 11.0 bar	Adjust the valve drive clearances. Replace faulty parts CTO
Insulation damage of high-voltage devices and circuits — interruptions in spark generation. Check with an ohmmeter for breaks or "punch-through" of the ignition coil windings and high-voltage wires	high-voltage wires	Replace the faulty ignition coil and damaged high-voltage wires
High-voltage wires are connected to t he ignition coil in the wrong order; o ne or more wires have become disconnected	Inspection	Connect the wires according to the markings on the ignition coil
Defective spark plugs: current leakage through cracks in the insulator or along the fouling on the heat cone	Check the spark plugs	Replace the defective spark plugs
Open circuit or short in the injector windings or their circuits	Check the injector windings with an ohmmeter and their circuits	Replace faulty injectors and ensure contact in the electrical circuits
Injectors are leaking (overflowing) or their nozzles are clogged	Check the seal and spray pattern. Clogged injectors can be cleaned on a special injector cleaning bench	on a special test bench CTO. H Replace injectors that are not sealed or are heavily clogged

List of Possible Faults	Diagnostics	Remedy Method
Mounts of the power unit have lost elasticity or are broken, their fastenings have loosened	Inspection	Replace the supports, tighten the fasteners
INCREASED CONTENT OF HARMFUL SUBSTANCES IN THE EXHAUST GASES		
Injectors are leaking (overflow) or their nozzles are contaminated	Check for leaks and the shape of the spray. Contaminated injectors can be cleaned using an injector spray bench. Replace injectors that are leaking or heavily contaminated.	
Damage to the high-voltage insulation. To check high-voltage wires, components, and circuits — use known-good parts to diagnose misfiring. Replace the ignition coils if faulty.		Replace the faulty ignition coil and damaged high-voltage wires. Under severe operating conditions (road salt, freezing temperatures alternating with thaws), it is advisable to replace the wires every 3–5 years.
Defective spark plugs: current leakage through cracks in the insulator or along carbon deposits on the heat cone, poor contact of the central electrode.	Check the spark plugs.	Replace the defective spark plugs.
The intake air temperature sensor is faulty. Use a tester to check the sensor in the intake manifold or its circuit.		Restore the electrical connections and replace the faulty sensor.
Coolant temperature sensor malfunction - Check the sensor resistance with an ohmmeter at different temperatures.		Replace the faulty sensor
Throttle position sensor or its circuits malfunctioning	Check the throttle position sensor for proper operation - Repair any contacts in the electrical circuits; replace the faulty sensor	
Oxygen concentration sensor malfunctioning or its circuits	Assess the oxygen concentration sensor's functionality and the reliability of its electrical connections. Repair any damaged wiring. Replace a faulty sensor. The sensor and its circuits can be evaluated using diagnostic equipment.	
The absolute air pressure sensor and its circuits are faulty.	Check the absolute pressure sensor for proper operation. The absolute air pressure can be checked using diagnostic equipment.	Restore the contacts in the electrical circuits. Replace the defective sensor.
ECU or its circuits are malfunctioning	To check, replace the ECU with a known good unit	Restore contacts in the electrical circuits. Replace the faulty ECU
Leak in the exhaust gas system between the exhaust manifold and the front pipe	at medium crankshaft speeds вала	Replace the defective gasket, tighten the threaded connections
The catalytic converter for exhaust gases is faulty	Check the catalytic converter for proper operation. The catalytic converter for exhaust gases can be replaced using diagnostic equipment	of the exhaust gas neutralizer exhaust gas neutralizer
Increased pressure in the fuel system due to a faulty pressure regulator	Inspection, check fuel system pressure with a gauge (no more than 3.5 bar) at idle	Replace the faulty regulator
Increased resistance to airflow in the intake tract of the intake manifold	Check the air filter element. Clean the intake tract; if the intake tract is contaminated, replace the air filter element (no foreign objects, leaves, etc.)	
Entry of a large amount of oil into the engine combustion chambers as a result of wear or damage to the oil-repellent caps, valve stems, valve guide bushings, piston rings, pistons, and cylinders	Inspection after engine disassembly	Repair the engine

Compression measurement

We perform the compression check to get an overall assessment of the condition of the components of the cylinder-piston group and the engine valve mechanism.

Carry out the check on an engine warmed up to operating temperature. Release the pressure i n the engine fuel system (see " Removal and disassembly of the fuel module," p. 114) and do not connect the wiring harness plug of the engine management system to the connector on the fuel module cover. Unscrew the spark plugs from the holes in the cylinder head (see " Replacing spark plugs on 1.4–1.6 (8V) engines," p. 31 or "Replacing spark plugs on 1.6 (16V) engines," p. 40). Install the compressor gauge fitting into the spark plug hole of the cylinder head...

...on engines 1.4–1.6 (8V)...

...and on the 1.6 (16V) engine. Crank the engine with the starter while the

accelerator pedal fully depressed for 2–4 s (the gauge readings should stop changing

increase).

Record the gauge reading and release the pressure in the compressor gauge.

For an accurate compression reading the battery must be fully charged — crankshaft speed should be at least 180 min^{-1}.

Check the compression in the other engine cylinders in the same way. Compression in a healthy engine should be within 11.0–13.0 bar, and the difference between cylinders should not exceed 2.0 bar.

To determine the cause of low compression, pour 10–15 cm^3 of engine oil into the cylinder through the spark plug hole and repeat the measurement. If the compression rises by more than 2.0 bar on the repeat measurement, the most likely cause is severe wear, sticking, or breakage of the piston rings. If the gauge reading does not increase after adding oil, the valve faces are probably not seating tightly against the cylinder head seats. This can occur if the valve clearance in the valve train is incorrect, or if the valve faces or seats are heavily worn, burned through, or damaged. The exact cause of the fault can only be determined after disassembling the engine.

Проверка цепи starter engagement

If, when turning the ignition key to the "D" position, the starter does not operate, the fault may be either in the starter itself or in its activation circuit (assuming the engine and battery are in working order).

Perform the starter inspection eм

in a service pit or on a ramp.

On a vehicle with a 1.4–1.6 (8V) engine, check the starter's condition—

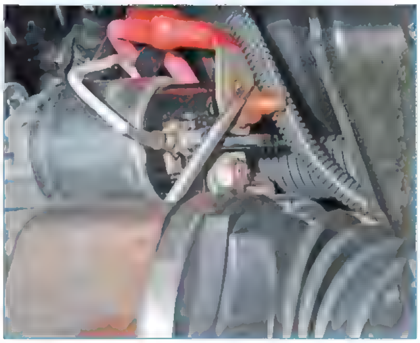
If possible, without removing the starter; on vehicles with the 1.6 (16V) engine, to test it you need to remove the starter (see "Removing and Testing the Starter," p. 251).

On a vehicle with a 1.4–1.6 engine (8V) remove the power unit protection—gata (see "Removing the power unit cover," p. 283). Put the gearshift lever in neutral and engage the—

handbrake. With the ignition off, disconnect the wire terminal from the control—

terminal of the traction relay (see "Removing and checking the starter," p. 251)

and checking the starter," p. 251).



Use a screwdriver shaft to bridge the traction relay winding ter minal and the upper contact bolt.

When performing this operation, take care because sparking may occur at the connection point. Do not touch the screwdriver to ground when joining the terminals.

If the crankshaft still turns, the starter is serviceable and the fault is due to damage in its engagement circuit. Otherwise, the starter or its pull-in relay is defective.

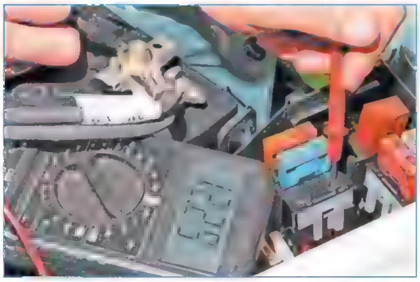
If it is not possible to repair the engagement circuit of a serviceable starter, then if necessary you can start the engine and drive to a re pair facility by turning on the ignition and bridging the terminals.

If the starter is faulty on a car with a manual transmission, you can get to a repair site by bump-starting the engine — transferring rotation to the crankshaft from the drive wheels through the transmission. This operation can be easily performed by two people on a stretch of (safe) level road, or even better, downhill. Move the gearshift to neutral and turn on the ignition. The helper pushes the car from behind and accelerates it. At that moment, depress the clutch and engage a gear (second gear is preferable), then slowly release the clutch pedal. With properly functioning control and fuel systems, the engine should start; then depress the clutch and disengage the gear. The faster you accelerate the car, the higher the crankshaft RPM will be and the easier the engine will start.

You can also get the engine turning over by towing the vehicle with another car.

A starter engagement fault can be caused by damage to the power circuit or the control circuit of the pull-in relay, or the contact assembly of the ignition switch. Power to the pull-in relay windings is supplied from the ignition switch, which in turn receives voltage from the battery through fuse F1 (60 A) in the fuse box located in the engine compartment. If this fuse blows, the starter will not engage, and most of the electrical consumers will also be without power (power windows, electric adjustment of the exterior rearview mirrors, rear window defogger, windshield wiper, and the heater fan).

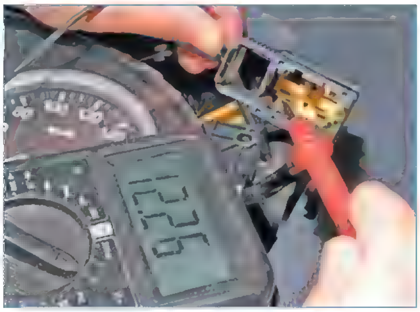
To diagnose a fault in the starter circuit, remove fuse F1 from the engine compartment fuse box (see “Electrical equipment,” p. 240).



Using a tester, check whether “+12 V” is supplied to the fuse terminal shown in the photo.

Connect the tester's negative probe to the negative terminal of the battery.

If no voltage is present at the fuse socket, the circuit from the battery to the socket is faulty (a broken wire or a short to ground). If voltage is present at the fuse socket, install a working fuse and use the tester to check the continuity of the circuit from the second fuse socket to the ignition switch. To do this, disconnect the wiring harness connector from the ignition switch (see "Replacing the immobilizer coil and ignition switch", p. 247).

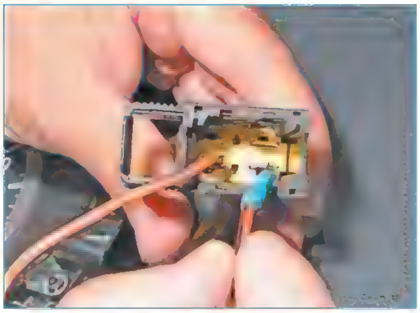


Connect the tester's positive lead to pin "4" of the wiring harness connector and the negative lead to ground.

The tester should indicate the battery voltage.

If not, the circuit from the second fuse socket to the ignition switch is faulty (a broken wire or a short to ground).

If voltage is supplied to terminal "4" of the ignition switch wiring connector...



...we briefly bridge terminals "4" and "6" of the wiring connector with a short length of wire.

At the same time, a click should be heard — the starter pull-in relay will engage.

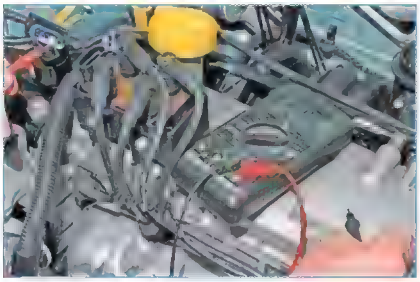
If the pull-in relay engages, the ignition switch or its connection to the wiring harness connector is defective; if it does not engage, the circuit from terminal "6" of the wiring harness connector to the terminals of the pull-in relay windings is faulty (a broken wire or a short to ground).

Testing the ignition coil of 1.4–1.6 (8V) engines and its circuits

We test the ignition coil and its electrical circuits when a fault is detected in the ignition system — when there is no spark at the spark plugs.

The ignition coil and the fuel pump receive supply voltage from the battery through fuse F3 (25 A) and then through relay K5 (power circuit), which are installed in the engine compartment fuse block (see “Electrical equipment”, p. 240). Voltage to the relay coil (control circuit) K5 is supplied from the ignition switch through fuse F02 (5 A), located in the interior fuse block.

To check the ignition coil power circuit, disconnect the coil (with the ignition turned off) the connector of the engine management wiring harness (see “ Removing the ignition coil,” p. 110). Connect the tester probes to the “C” terminal of the wiring harness connector and to the engine ground. Immediately after switching on the ignition (while the fuel pump is running)...



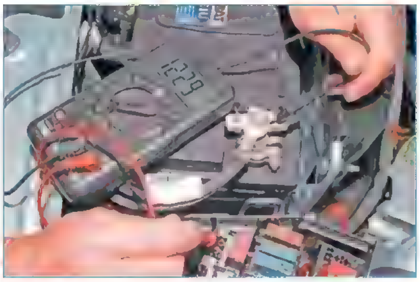
...the instrument should register a voltage approximately equal to the battery voltage.

If there is no voltage at the “C” terminal of the wiring harness connector, possible faults include: fuses, the contact set of the ignition switch, relay K5, or their electrical circuits.

With the ignition off, remove relay K5 from the fuse/relay box in the engine compartment and disconnect the wiring harness connector from the ignition coil. Connect the probes

connect the tester (set to ohmmeter) to relay socket “5” and to terminal “C” of the ignition coil wiring harness connector.

If the tester reads “infinity” – there is an open circuit.
If the circuit is intact, we check whether “+12 B” is being supplied from the battery to socket “3” of relay K5.To do this...



...connect the tester’s positive probe to the relay socket and the negative probe to the battery “-” terminal.

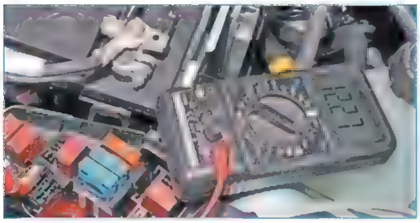
If there is no voltage, check fuse F3 (25 A). If the fuse is intact, check the circuit from the fuse socket to the relay socket.

To do this, remove the fuse...

...and attach the tester probes (set to ohmmeter) to fuse socket “ S2” (as shown in the photo) and to relay socket “3”.

If the tester reads infinity – there is an open circuit. If the circuit is intact check whether “+12 V” is being supplied

from the battery to the other fuse socket. For this...



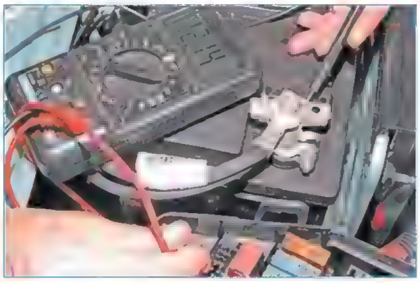
...we connect the tester's positive probe to the relay/fuse socket labeled “E2” (shown in the photo), and the negative probe to the battery "-" terminal.

The tester should show the battery voltage. If it does not, there is a fault in the circuit (an open circuit or a short to ground) from the battery to the fuse socket.

To check the control circuits of relay K5, disconnect the wiring harness connector of the engine management system from the ECU (with the ignition off).

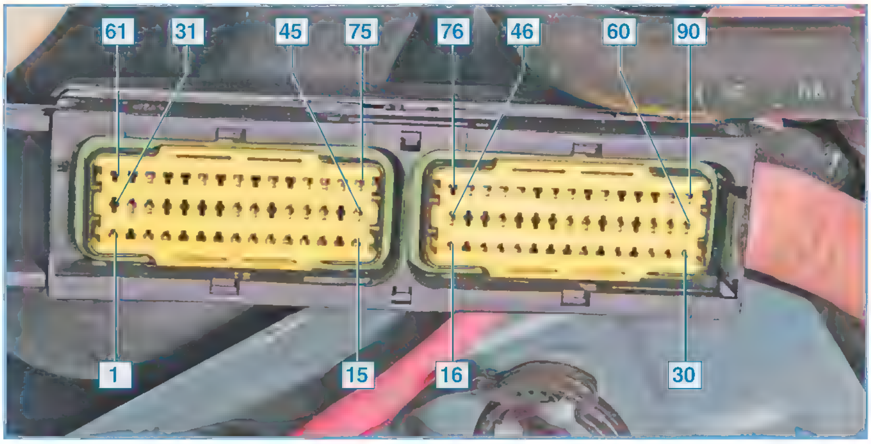
Connect the tester probes (in ohmmeter mode) to socket “2” of the relay and pin “67” of the ECU wiring harness connector. If the tester indicates “infinite” resistance, that means there is an open circuit in the relay's control (negative) line.

If the relay's negative control circuit is intact, check whether +12 V is supplied to socket “1” of the relay. For this...



...connect the tester's positive probe to the relay terminal labeled " 1", and the negative probe to the "-" terminal of the battery.

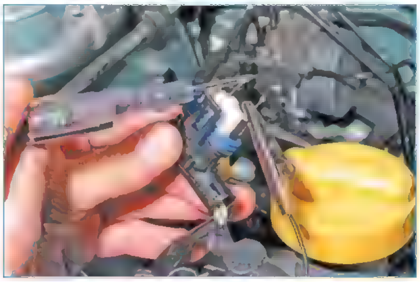
With the ignition on, the tester should display voltage



Pin numbering of the ECU wiring harness connector of the battery. If there is no voltage, check fuse F02 located in the fuse box in the cabin. If the fuse is intact, check the circuit from the fuse socket to terminal "1" of the relay and the circuit from the other fuse socket to terminal " 3" of the connector of the ignition switch wiring harness.

To check the ignition coil control circuits you can use a test lamp of 1–2 W. Relieve the pressure in the engine fuel system (see "Removal and disassembly of the fuel module", p. 114) and do not reconnect the engine management wiring harness connector to the fuel module connector. Disconnect the wiring harness connector from the ignition coil and connect the test lamp probes to terminals "C" and "A" of the wiring harness connector. If the test probes do not fit into the connector terminals, insert lengths of bare wire into the terminals (pins can be used).

With the ignition coil power and control circuits intact, while turning the crankshaft with the starter...



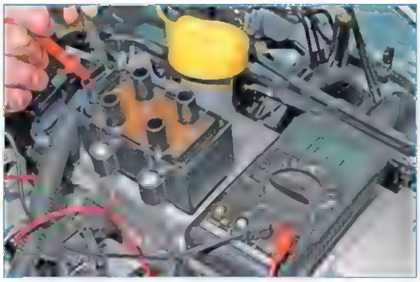
...the test lamp should flash frequently.

If not, check the wire connecting terminal "A" of the coil harness connector to terminal "32" of the ECU harness connector for open circuit or short to ground.

Similarly, by connecting the tester probes to terminals “C” and “B” of the ignition coil wiring harness connector, and then to terminal “B” of the coil wiring harness connector and to terminal “1” of the ECU wiring harness connector, we check the other ignition coil control circuit.

You can check the ignition coil itself on the engine by disconnecting its harness connector and the high-tension leads.

To test one of the coil's primary windings, connect the meter probes to terminals "C" and "A" of the coil.

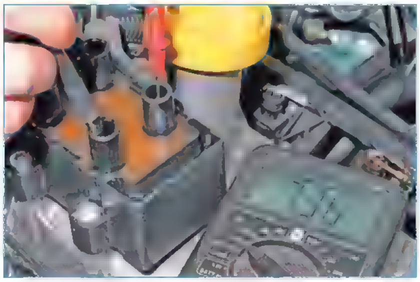


In the ohmmeter mode, check the winding for an open circuit.

If the tester shows “infinity,” there is a break in the winding.

Similarly, by connecting the tester probes to the coil’s “C” and “B” terminals, check the other primary winding of the coil for an open circuit.

To check the secondary winding for an open circuit, connect the tester probes to the paired high-voltage terminals of the coil (terminals for cylinders 1–4 or 2–3).



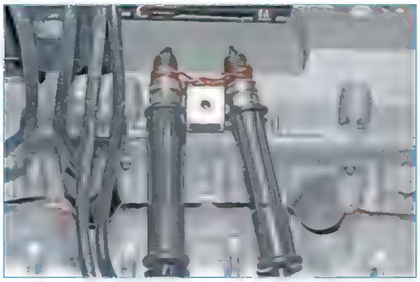
A serviceable ignition coil should register approximately 7.0 kΩ on the tester.

If the secondary winding is open, the tester will show “infinity.”

Similarly, check the other secondary winding of the ignition coil. Testing the secondary windings of the ignition coil for breakdown is carried out on the engine.

Depressurize the engine fuel system and do not connect the wiring harness plug to the fuel module connector.

Two known-good spark plugs are required for the test.



Connect the spark plug bodies with a length of uninsulated wire ("ground" them).

Using serviceable high-tension leads, connect the paired outputs of the ignition coil to the spark plugs and place the plugs on the cylinder head cover. Crank the crankshaft with the starter.

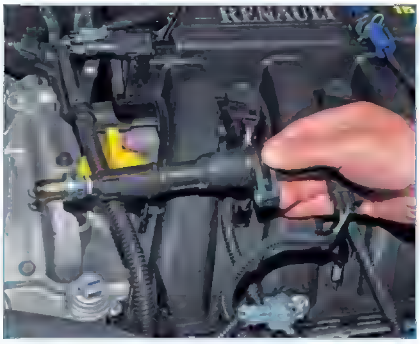
! **To avoid electric shock, do not touch the spark plugs or the tips of the high-tension leads.**

With a functioning ignition coil, sparks should jump regularly between the plug electrodes. Similarly, by connecting the high-tension leads to the other two paired coil outputs, check the other secondary winding for breakdown.

Testing the ignition coils and their circuits on the 1.6 (16V) engine

To check the operation of the ignition coil, release the pressure in the engine fuel system (see “Removal and disassembly of the fuel module,” p. 114) and do not connect the wiring harness connector of the system

of the engine control to the fuel module cover connector.
Remove the ignition coil and insert a known-good spark plug into it.



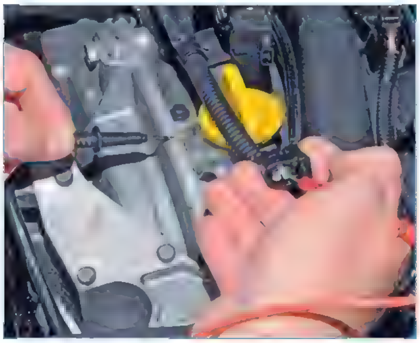
Приж we have the threaded portion of the spark plug
to the metal of the engine's metallic part.

To avoid electric shock when the starter turns the crankshaft, do not touch the spark plug with your hands.

An assistant, turning the ignition key to the "D" position, operates the starter to turn the crankshaft.

With a good spark plug, ignition coil, and its circuit, sparks should regularly jump between the plug electrodes. If they do not, the coil power and control circuit must be checked.

To check the ignition coil power circuit, disconnect the wiring harness connector of the engine management system from coil 1 or 2 of the cylinder...



...and we connect one probe of the tester to the engine ground and the other to terminal 1 of the wiring harness plug.

With the ignition on, the device should register the battery voltage.
If there is no voltage, the following may be faulty: fuses, the ignition switch contact assembly, relay K5, or their electrical circuits.

See the check of relay K5 circuits and fuses F3 and F02 in "Checking the ignition coil of the 1.4–1.6 (8V) engine and its circuits," p. 67.

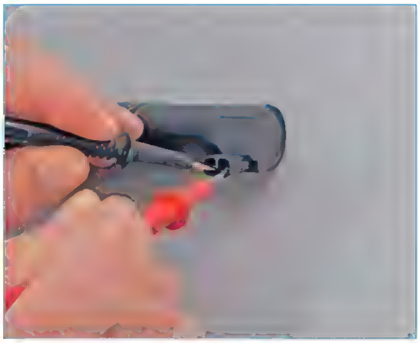
To check the ignition coil control circuit, use a test lamp rated 1.2 W. Depressurize the engine fuel system (see "Removing and disassembling the fuel module," p. 114) and do not connect the engine management wiring harness connector to the fuel module connector. Disconnect the wiring harness connectors from the ignition coils of cylinders 1 and 4. Connect the test lamp probes to terminal "1" of the wiring connector for coil 1 and terminal "2" of the wiring connector for coil 4.

With proper control circuits and power to the ignition coil during cranking of the crankshaft by the starter the lamp should blink frequently. Otherwise, б check for an open circuit or a short to ground in the wire connecting terminal "2" of the 4th cylinder coil harness to terminal " 32" of the ECU harness.

Similarly, check the circuits for the coils of cylinders 2 and 3 by connecting the tester probes to terminal "2" of the 3rd cylinder coil harness and to terminal "1" of the ECU harness.

If the power and control circuits of the ignition coil are intact, but there is no spark at the spark plug when checked (see above), the coil itself should be inspected.

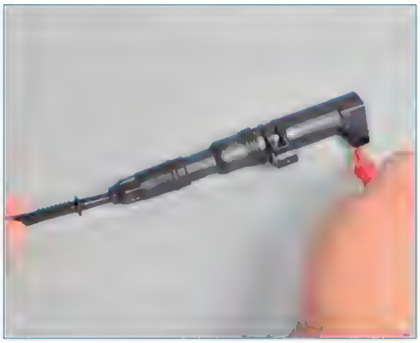
To test the ignition coil, you should measure the resistance of the coil's primary and secondary windings.
To test the primary winding...



...connect the tester probes (in the ohmmeter mode) to terminals "1" and "2" of the ignition coil.

On a good coil, the resistance of the primary winding should be
measure 0,5±0,02 Ω.

To check the secondary winding...



...we connect the tester probes (in ohmmeter mode) to terminal "2" and to— the high-voltage terminal of the ignition coil. On a serviceable coil, the resistance of the secondary winding should be—
7,5±1,1 kΩ.

If the coils are good, check the connection circuit between the plug harnesses of the coils for cylinders 1 and 4. To do this, disconnect the wire plugs from the ignition coils of cylinders 1 and 4 and connect the tester probes (in ohmmeter mode) to terminal "2" of the wire plug for the coil of cylinder 1 and to terminal "1" of the wire plug for the coil of cylinder 4. If the tester reads " infinite," the circuit is open.

Similarly, check the connection circuit of the coils of cylinders 2 and 3 by connecting the tester probes to terminal "2" of the wiring connector for the coil of cylinder 2 and to terminal "1" of the wiring connector for the coil of cylinder 3.

Inspection of high-voltage leads for 1.4–1.6 (8V) engines

We inspect the high-voltage leads when sparking at the spark plugs is disturbed. For the check, remove the high-voltage lead from the ignition coil terminal...

...and from the spark plug.

Connect the tester probes to the terminals of the high-voltage lead.

The resistance of a good lead should be within 1–5 kΩ. Check the high-voltage leads of the spark plugs on the other cylinders in the same way.

Checking the engine management system sensors

We check the engine management system sensors and their circuits when faults appear in the engine's operation, or when the vehicle's dynamic and speed characteristics deteriorate, and also when its fuel efficiency decreases.

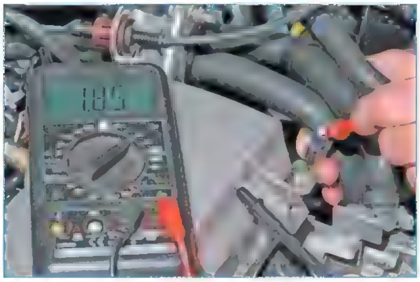
When troubleshooting or repairing the management system, it is necessary to perform a thorough inspection of the engine compartment. During the inspection, check the correctness and security of the connector connections of the engine management wiring harness to sensors and actuators, and also pay attention to any burned, deformed, or chafed wires. The inspection may help resolve the fault without further testing.

Below are checks of sensors that can be performed independently without diagnostic equipment.

Checking the crankshaft position sensor and its circuits

If the crankshaft position sensor or its circuits fail, the engine will not start or run. With the ignition off, disconnect the wiring harness connector from the crankshaft position sensor.

Connect the tester probes to terminal "2" of the sensor harness connector and to the engine " ground." With the ignition on and the crankshaft stationary...



...the tester should register a voltage of about 2.0 V.

A similar voltage should be present between terminal “1” and sensor harness connector and the engine "ground." If the voltage readings do not meet the specifications, disconnect the harness connector from the ECU (with the ignition off). Check the circuits for continuity and short to " ground" between terminal "2" of the sensor harness connector and terminal "24" of the ECU harness connector, and between terminal "1" of the sensor harness connector and terminal "54" of the ECU harness connector. If the voltages are incorrect and the circuits are good, the ECU is faulty. To check the resistance of the sensor winding...

...we connect the tester probes to the terminals of the sensor (shown on the removed sensor for clarity).

The coil resistance of a serviceable sensor should be 200–270 ohms.

For further testing, remove the sensor (see “Crankshaft Position Sensor Removal,” p. 106) and connect the tester probes to the sensor terminals.

Switch the tester to AC voltage measurement mode...

...and several times bring a steel rod close to the sensor tip

With a functioning crankshaft position sensor, the device should detect voltage spikes.

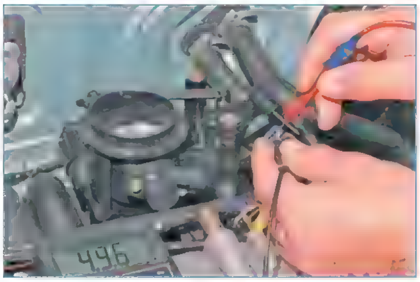
Checking the throttle position sensor and its circuits on 1.4–1.6 engines (8V)

With the ignition off, disconnect the engine management wiring harness connector from the throttle position sensor.

The harness connector terminals are labeled “A”, “B”, and “C” on the end where the wires enter.

To check the sensor power circuit, connect the tester probes to terminals “A” and “B” of the connector.

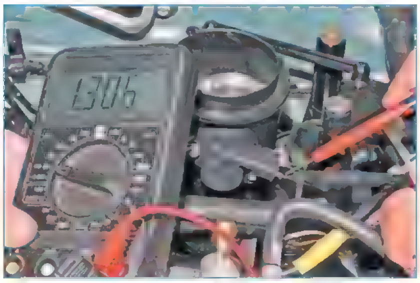
With the ignition turned on...



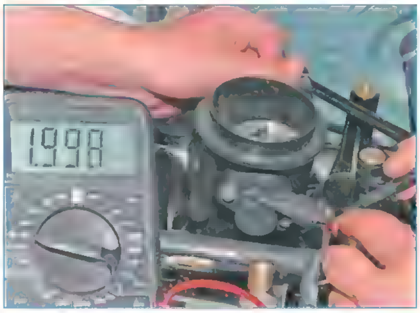
...the device must record a voltage of 4.8–5.2 V.

If there is no voltage, disconnect the wiring harness connector from the ECU (with the ignition off). Then check the circuit condition (open or short to ground) of the sensor power circuit (“+”) between pin “74” of the ECU wiring harness connector and pin “B” of the sensor wiring harness connector. Also check the sensor ground circuit between pin “75” of the ECU wiring harness connector and pin “A” of the sensor wiring harness connector. If the circuits are good but the voltage is out of range, the ECU is faulty. In the same way, check the sensor signal circuit between pin “43” of the ECU wiring harness connector and pin “C” of the sensor wiring harness connector.

To check the functionality of the throttle position sensor itself, disconnect its connector from the wiring harness and measure the sensor’s resistance by attaching the tester probes to the sensor terminals “C” and “A”. For convenience during measurement, connect short lengths of bare wire to the sensor terminals.



With the throttle valve closed, the resistance should be 960–1440 Ω...



...and with the valve fully open — about 2 kΩ.

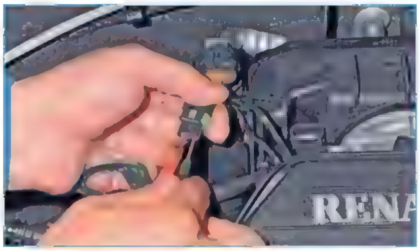
If the sensor's resistance falls outside these limits, the sensor must be replaced.

Throttle Position Sensor and Circuit Check for 1.6 (16V) Engine

With the ignition off, disconnect the engine control wiring harness plug from the throttle position sensor.

The wiring harness plug terminals labeled “A”, “B” and “C” are marked on the side of the plug.

To check the sensor's power supply circuit...

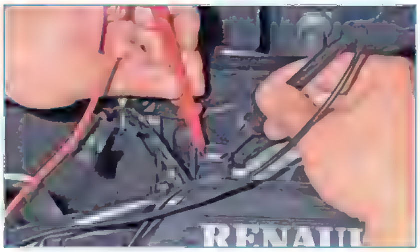


...connect the tester's positive probe to terminal “B” of the connector, and the negative probe to terminal “A”. With the ignition on, the instrument should register a voltage

4.8–5.2 V.

If there is no voltage, disconnect the wiring harness connector from the ECU (with the ignition off). Then check the integrity (open circuit and short to ground) of the sensor power circuit (“+” power) between terminal “74” of the ECU wiring harness connector and terminal “B” of the sensor wiring harness connector. Also check the sensor ground circuit between terminal “75” of the ECU wiring harness connector and terminal “A” of the sensor wiring harness connector. If the circuits are intact but the voltage is out of range, the ECU is faulty. In the same way, check the sensor signal circuit between terminal “43” of the ECU wiring harness connector and terminal “C” of the sensor wiring harness connector.

To check the sensor of the throttle valve position itself, disconnect its wiring harness connector and measure the sensor resistance with the throttle valve fully closed and then fully open between terminals “A” and “C”, “A” and “B”, and “B” and “C”.



With the throttle valve closed, the resistance between terminals “A” and “C” should be 1245 Ω...

...and with the throttle open – 2230 Ω.

The resistance between terminals “A” and “B” with both the throttle open and closed should be 1250 Ω.

The resistance between terminals “B” and “C” should be 2230 Ω with the throttle open and 1245 Ω with the throttle closed. If the sensor resistances differ from the specified values, the sensor must be replaced.

Coolant Temperature Sensor and Circuit Check

The procedure is shown for the 1.4–1.6 (8V) engine; the check for the 1.6 (16V) engine is performed similarly.

If the coolant temperature sensor or its circuits are damaged, the cooling system fan runs continuously while the engine is running and continues to run even after the ignition is turned off.

With the ignition off, disconnect the wiring harness connector of the engine management system from the coolant temperature sensor.

The pin markings of the sensor harness connector — "A", "B1" and "B2" — are indicated on its housing. With the tester probes connected to the "B2" pin of the sensor harness connector and to the engine ground, and with the ignition switched on, measure the sensor supply voltage.

Reference resistance values of the coolant temperature sensor (CTS) at various coolant temperatures

Coolant temperature, °C	Resistance, Ω
120	87±20
110	114±3
80	280±90
50	810±38
25	2250±112
–10	12460±1121
–40	75780±6970

The instrument should register a voltage of 4.8–5.2 V.

If there is no voltage, disconnect (with the ignition off) the wiring harness connector from the ECU and use a tester to check the circuit («+» sensor supply) between terminal “B2” of the sensor harness connector and terminal “13” of the ECU for open circuit and short to ground. If the circuit is intact, the ECU is faulty.

Connect the tester probes to terminal “B1” of the sensor harness connector and to engine ground to check the sensor ground circuit.

If the circuit is intact, the meter should register a resistance of less than 1 ohm. If the meter reads “infinity,” there is an open circuit between terminal “B1” of the sensor wiring connector and terminal “73” of the ECU.

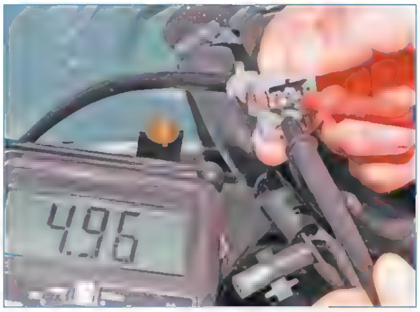
To check the sensor, disconnect the wiring harness connector from the engine management system sensor.

Using a multimeter, measure the resistance between terminals B1 and B2 of the sensor at two coolant temperatures — with the engine cold and with the engine warmed up. Compare the obtained values with the reference values (see table).

If the measured resistance values do not match the reference values, the sensor must be replaced.

Checking the intake air temperature sensor and its circuits

The procedure is shown for the 1.4–1.6 (8V) engine; for the 1.6 (16V) engine the check is performed similarly. With the ignition off, disconnect the engine management wiring harness connector from the intake air temperature sensor. The connector pins are marked “1” and “2” on the connector housing. With the ignition on...



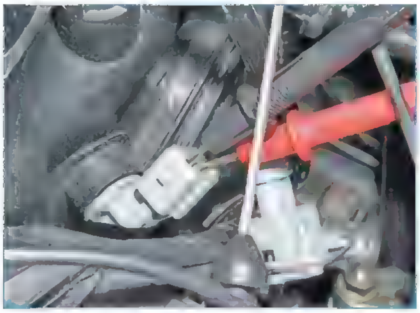
...measure the voltage between the connector pins with a tester.

Reference resistance values of the IAT sensor at various intake air temperatures

Air temperature, °C	Resistance, Ω
120	105±7
110	135±8
80	309±17
50	810±47
25	2050±123
–10	9540±1044
–40	49930±6790

With the sensor circuits functioning correctly, the tester should show a voltage of 4.8–5.2 V. If the voltage does not match the required value, check the circuits (for an open or a short to ground) between terminal "1" of the sensor connector and terminal "49" of the ECU harness connector, and also between terminal "2" of the sensor connector and terminal "77" of the ECU harness connector. If the circuits are intact, the ECU is faulty.

To check the sensor with a thermometer, measure the temperature of the intake pipe next to the sensor...



...and with a tester, measure the resistance between the sensor terminals.

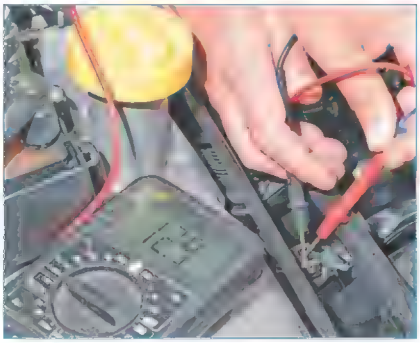
Compare the obtained value with the reference values (see table). If the measured resistance does not match the reference, the sensor must be replaced.

Injector check

The work is shown on the 1.4–1.6 (8V) engine; checks on the 1.6 (16V) engine are performed in the same way.

With the ignition off, disconnect the wiring connector from the injector.

On the 1.6 (16V) engine, first remove the fuel rail shield (see "Removing the fuel rail shield," p. 139).



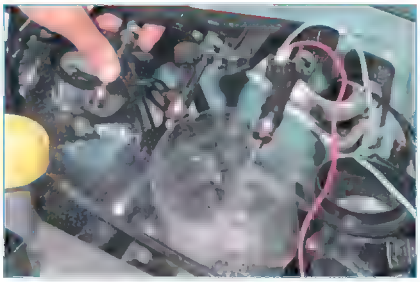
Connect the tester probes to the injector terminals and measure the resistance of its winding.

The winding resistance of a serviceable injector should be (at 20 °C) approximately 12.0 Ω for the 1.4–1.6 (8V) engine, and 14.5 Ω for the 1.6 (16V) engine.

To check spray quality and injector tightness, remove the fuel rail with the injectors (see "Removing the fuel rail and injectors," pp. 117, 164). Attach a fuel supply hose to the rail fitting. Test each injector in turn, placing a container under it to collect fuel.

With the ignition switched on, connect the injector terminals directly to the battery using two wires to supply 12 V (note that after switching on the ignition the fuel pump runs for 2–3 seconds).

! **The operation of checking the injector spray quality is fire-hazardous. Do not allow sparks when applying voltage to the injector.**



Fuel streams with the characteristic spray cone should exit the injector nozzle.

Disconnecting the wires from the injector, check whether fuel is leaking through the injector nozzle holes. Fuel leakage should not exceed one drop per minute.

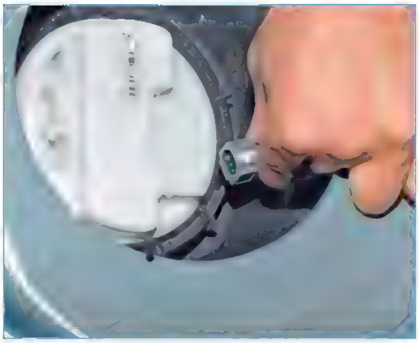
Check the other injectors in the same way. If the injector's electrical resistance does not meet the specification, the amount of injected fuel and the spray pattern differ significantly from those of the other injectors, or the injector is not sealed, it must be replaced.

Checking the pressure in the engine fuel system

The pressure in the engine fuel system can be checked with a regular pressure gauge (for example, one from a tire pump).

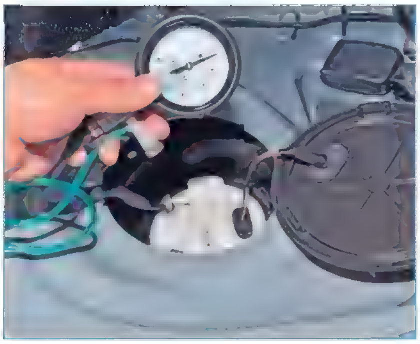
Place the oil- and gasoline-resistant reinforced hose (with an inner diameter of 12 mm) onto the threaded fitting of the pressure gauge and secure it with a clamp.

Release the pressure in the engine fuel supply system (see "Removal and disassembly of the fuel module," p. 114).



Disconnect the fuel supply hose end from the fitting on the fuel module cap.

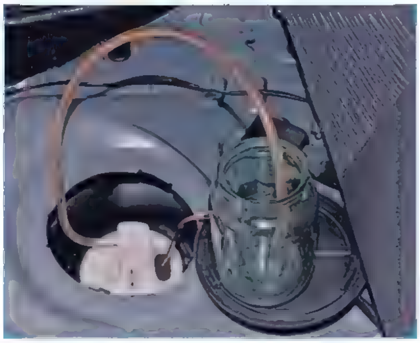
Connect the wire plug to the fuel pump cover connector.



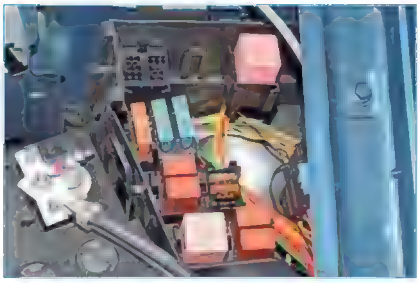
Connect a hose with a pressure gauge to the fitting on the fuel module cap and secure it with its clamp.

Turn on the ignition; the fuel pump will run for 2–3 s. The pressure gauge should show 3±0, 2 bar. If the pressure is higher than specified, the fuel pressure regulator is faulty. If the pressure is lower than specified and falls after the pump is switched off, the cause may be a leak in the fuel module connections, a faulty pressure regulator, or a faulty fuel pump.

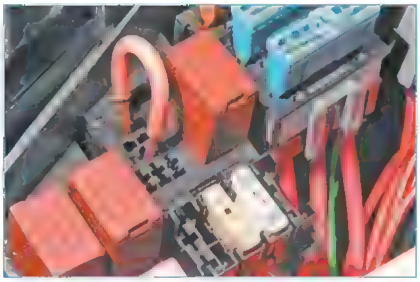
To assess the fuel pump's performance, connect a hose (without a gauge) to the fitting on the fuel module cap...



...and lower the other end of the hose into a container with a capacity of at least 2 liters.



Remove relay K5 from the engine compartment fuse/relay box.



By shorting the relay terminals "3" and "5" with a piece of wire...

...turn on the fuel pump for 1 minute. Turn off the fuel pump and measure the volume of fuel pumped into the container. If the fuel volume is less than 1.0 L, the pump must be replaced. The minimum fuel pump delivery is 60 L/h.

Transmission, suspension, steering and braking system

Cause of malfunction	Remedial method
CLUTCH	
CLUTCH SLIPPING (NOT FULLY ENGAGING) WHEN THE ACCELERATOR PEDAL IS SUDDENLY DEPRESSED, THE ENGINE REVVS, BUT THE VEHICLE HARDLY ACCELERATES; A BURNING SMELL FROM OVERHEATED FRICTION LININGS MAY BE DETECTED; INCREASES FUEL CONSUMPTION	
Oil contamination of the flywheel, pressure plate, and driven disc friction linings — Thoroughly wash the oil-contaminated surfaces with white spirit or gasoline and wipe them dry.	
	If the driven disc is heavily oil-soaked, replace it. Eliminate the cause of oil contamination (oil leak through the engine or transmission seals)
Reduced diaphragm spring force of the diaphragm spring	Replace the pressure plate assembly with the cover ("clutch basket")
Severe wear or burning of the driven disc friction linings	Replace the driven disc assembly
Damage or sticking of the clutch actuator	Eliminate the sticking. If necessary, replace the actuator components
CLUTCH SLIPS (DIFFICULT SHIFTING OF FORWARD GEARS, REVERSE ENGAGES WITH NOISE WHEN THE TRANSMISSION IS FUNCTIONING PROPERLY)	
Incorrect adjustment of the clutch actuator (pedal travel insufficient)	Adjust the actuator. Replace a deformed clutch fork
Clutch cable sticking	Lubricate the cable with engine oil. If that does not help (cable strands are frayed, the sheath is damaged), replace t he cable
Loosening of rivets or breakage of friction linings, warping of the driven disc (end runout more than 0.5 mm)	Replace the driven disc
Severe and uneven wear. Replace the flywheel. If there is wear or scoring on the working surfaces of the pressure plate or on the friction surfaces of the flywheel or pressure plate, replace the pressure plate assembly (the clutch " basket").	

Cause of malfunction	Remedy
Seizing of the driven disc hub on the transmission input s haft splines. Clean the splines of dirt; remove minor damage with a fine file. If splines are significantly worn or damaged, replace the disc and/or the transmission input shaft. Before assembly, apply fresh SHRUC–4 grease to the splines.	
Warping or distortion of the pressure plate	Replace the housing with the pressure plate assembly (the clutch " basket")
JERKING WHEN STARTING OFF	
Seizing of the clutch cable cable	Lubricate the cable with engine oil. If that does not help, replace the cable
Seizure of the driven hub Clean the splines of dirt; remove minor damage on the splines of the transmission input shaft with a file. If the splines are heavily worn or damaged, replace the disc and/or the transmission input shaft.	
	Before assembly, apply fresh grease to the splines: CV Joint Grease – 4
Warping of the driven disc	Replace the driven disc
Loosening of the friction lining fastenings on the driven disc, severe wear or chipping or cracks in the li nings	Replace the driven disc
Loss of elasticity of the driven disc's spring plates	Replace the driven disc
Significant settling or breakage of the torsional vibration damper springs; wear of the spring seats	Replace the driven disc
Scoring on the flywheel or pressure plate working surfaces — replace the flywheel or the clutch housing assembly with the pressure plate (the clutch "basket")	
If the friction surfaces of the driven disc linings are contaminated with oil—Thoroughly wash the oily surfaces with white spirit or petrol and dry them thoroughly by wiping. Replace the heavily oiled driven disc. Eliminate the cause of the oil contamination.	

* Troubleshooting of the brake system with ABS must be carried out on , except for checks of the condition of electrical connections and hydraulic lines of the system, as well as the wheel brake mechanisms

Cause of malfunction	Remedy
RATTLE, KNOCKING OR NOISE WHEN ENGAGING THE CLUTCH	
Severe settling or breakage of the damper torsion springs; wear of the spring seats	Replace the driven plate
Warping of the driven disc	Replace the driven disc
Loosening of the friction lining attachments of the driven disc, severe wear or cracks in the linings	Replace the driven disc
INCREASED NOISE WHEN RELEASING THE CLUTCH	
Wear, damage, or grease leakage from the clutch release bearing	Replace the bearing
GEARBOX NOISE (NOISE DECREASES OR DISAPPEARS WHEN CLUTCH IS DEPRESSED)	
Insufficient oil level in the gearbox housing	Check the level and top up the oil if necessary. Check for leaks (see “Oil Leak”). Blow out the breather
Low oil quality. Water has entered the oil (when water gets into the oil, a whitish emulsion forms)	Replace the oil. Cross fords and deep puddles cautiously
Wear or damage to bearings, - hip bushes, gear teeth	Replace worn bearings - bearings, gears CTO
GEARS ENGAGE WITH DIFFICULTY, NO EXTRANEOUS NOISES	
Gearshift control rod is bent	Straighten or replace the rod
Mounting bolts of the gearshift mechanism have loosened	Tighten the bolts (apply anaerobic sealant to their threads)
Fracture of plastic components of the control drive	Replace the parts
Incorrect actuator adjustment	Adjust the actuator
The springs of the gear-shifting mechanism are broken, its parts are deformed	Replace the springs, straighten the deformed parts, or replace the assembly CTO
Loosening of fork seats gear shifting on stalks	Tighten the fork retainers on the stalks CTO
Gearbox shaft nuts are loose	Tighten the nuts CTO

Cause of malfunction	Remedial action
Does not fully disengage clutch	See “Clutch drags”
GEARS DISENGAGE SPONTANEOUSLY	
Damage or wear of the splines on the coupling, gear, or synchronizer hub	Replace the defective parts CTO
Incorrect adjustment of the drive	Adjust the drive
The springs in the gear-shifting mechanism have loosened, the rods are worn	Replace worn parts CTO
Shaft nuts of the transmission box are not tightened	Tighten the nuts CTO
The mounts of the power unit have lost elasticity or are damaged	Replace the mounts
NOISE, CRACKING, GEAR SCREECH WHEN ENGAGING A GEAR	
The clutch does not fully disengage	See “Clutch drags”
No oil in the gearbox crankcase—transmission	Add oil. Check for Check for leaks (see “Oil leak”). Blow out the breather
Bearings damaged, gear teeth	Replace bearings, gears CTO
Wear of the synchronizer ring of the engaged gear	Replace the ring CTO
GEARBOX NOISE (NOISE FROM THE GEARBOX ONLY WHILE THE VEHICLE IS MOVING)	
Wear or damage to bearings — Replace worn or damaged bearings of the secondary shaft and the differential (even with minimal wear). Adjust the preload of the differential box bearings.	
GEARBOX OIL LEAK	
The gearbox breather is clogged	Blow out the gearbox breather
Wear of oil seals: primary shaft, right wheel drive, bearing of the inner joint housing of the left wheel drive	Replace the oil seals and the bearing of the inner joint housing of the left wheel drive
Severe wear, dents on the shaft surfaces where the oil seals operate	Minor damage — clean with fine-grit sandpaper and polish. For significant damage, replace the shafts and oil seals

Cause of malfunction	Remedy
Torn inner boot Replace the left wheel drive hinge boot	
Loose crankcase mounting of the clutch and gearbox cover	Tighten the threaded connecния
Drain plug not tightly screwed in, reverse light switch	Tighten the drain plug, reverse light switch
KNOCK WHEN STARTING OFF	
Wear of drive joints front wheels	Replace worn ball joints or drives
Wear or damage to the rubber element of the upper mount of the strut, rubber-metal ball joints (silent blocks) of the suspension arms, bushings and mounts of the anti-roll bar	Replace worn or damaged parts
Fastenings of the anti-roll bar to the body, the front suspension steering k nuckle to the strut, the suspension arms to the subframe, or the strut have loosened to the body	Tighten threaded connections
Severe wear of the front wheel hub bearing or loosening of the bearing nut	Tighten the wheel hub bearing nut; if necessary, replace the bearing
Broken suspension spring	Replace the spring (replace both suspension springs at once — left and right)
Brake lining delamination from the shoe backing	Replace the brake shoes (simultaneously all on the same axle)
The power unit mounts have lost elasticity or have disintegrated	Replace the mounts
The subframe fastenings have loosened	Tighten the subframe mounting bolts
Clutch malfunction	See clutch fault diagnosis
NOISE WHILE DRIVING THE VEHICLE ON A SMOOTH ROAD	
Wear of wheel hub bearings wheels	Replace the wheel hub bearings wheels
The tires are not intended for these operating conditions (on asphalt they are used — all-terrain, studded tires, etc.)	Use tires in accordance with their intended purpose

Cause of malfunction	Remedy
Uneven wear or tread separation, tire or rim deformation	Replace the wheel
The wheel rubs against the inner fender лок	Check and adjust the wheel alignment angles, replace deformed suspension parts and sagging springs. Do not overload the vehicle. Use wheel rims of the specified size.
Wheel bolts are hitting rear brake assembly parts — use bolts matching the wheel rim thickness	
Wheel mounting bolts have loosened	Tighten the bolts; if the wheel rim is deformed, replace the rim
Brake pad separation — Replace the pads (preferably all on the same axle at once) from the pad backing	
KNOCKING WHEN DRIVING OVER SMALL BUMPS	
Shock absorber or upper mount of the strut is faulty	Replace both shock absorbers (both struts) or the strut mount of the strut
Wear of the front suspension ball joint	Replace the ball joint
Wear of the stabilizer bushings lateral stability	Replace the stabilizer bushings
KNOCKING, SQUEAKING DURING SUSPENSION OPERATION (OFF-ROAD DRIVING)	
Vehicle overload	Do not overload the vehicle. Distribute the load evenly (use the cabin)
Faulty shock absorber	Replace both shock absorbers (both struts)
Compression bump stop damaged тия	Replace the compression travel buffer
Sagging or breakage of the suspension spring ны подвески	Replace both springs — left and right
Damage or sagging of the strut top mount	Replace the top mount struts
Suspension arms, the anti-roll bar (stabilizer bar), tie rods, subframe, and rear suspension beam are deformed. The fastenings of these parts have loosened.	Replace the deformed parts. Tighten the threaded connections.
Wear of ball joints and front suspension silent-blocks (bushings).	Replace the worn parts.
Fastenings of suspension components, steering, brake system, and power unit have loosened.	Tighten the threaded connecния

Cause of malfunction	Remedy
Have lost elasticity or mounts of the power unit have broken power unit	Replace the power mount unit aggregate

TRACES OF SHOCK ABSORBER FLUID VISIBLE ON THE SHOCK ABSORBER (STRUT)

Leakage of fluid from the shock absorber — Slight "sweating" of the absorber (due to wear of the rod seal, sealing ring of the reservoir, dents and damage to the chrome plating of the rod). If there are no drips and the shock absorber's characteristics are preserved, this is not a fault. You can check the shock absorbers by rocking the car by the fender. No more than 1–2 free oscillations of the vehicle are permitted.

ON THE JOINT BOOT AND/OR DRIVE SHAFT WHEELS CLEARLY VISIBLE LACK OF JOINT LUBRICATION

The protective boot of the joint is damaged, its clamps have loosened	Inspect the joint; if there is play — replace it. If there is no play and the grease is only slightly contaminated, without disassembling the joint remove as much grease as possible with a screwdriver and pack in new grease. Replace the damaged boot and clamps

KNOCKING, CLICKING DURING VEHICLE TURNING

Wear of the outer wheel drive joint	Replace the wheel drive
Axial play of the wheel (severe wear of the front wheel hub bearing or loosening of the hub bearing nut)	Tighten the wheel hub bearing nut; if necessary, replace the bearing

VEHICLE PULLING STRAIGHT-LINE MOVEMENT (ON A LEVEL ROAD)

Unequal air pressure in the tires	Set the tires to the correct pressure
Incorrect caster angle and/or front wheel camber wheels	Adjust the caster and/or camber angles of the front wheels СТО
Significant difference in tire wear	Replace the worn tire
Uneven sagging of the front suspension springs	Replace both springs
Suspension and/or body components of the vehicle are deformed	Straighten or replace deformed suspension components and body panels
Rear axle offset due to wear of the rear suspension beam arm bushings	Replace the beam arm bushings of the beam arms
Wheel drag due to a stuck wheel cylinder piston	Replace the wheel cylinder

Cause of malfunction	Remedy
Front wheel dragging due to loosening of the bolts securing the guide of the pads to the steering knuckle (caliper displaced)	Tighten the bolts
Rear wheel dragging due to loosening or breakage of the return spring of the rear brake pads	Replace the spring
Increased imbalance of the front wheels	Balance the wheels

UNEQUAL TIRE TREAD WEAR

Increased wheel imbalance	Balance the wheels
Tire or rim deformation	Replace the wheel
Unequal tire pressures	Set the correct tire pressure
Incorrect wheel alignment angles	Adjust the wheel alignment angles СТО
High speed when cornering, negotiating corners with wheel spin or sliding	Maintain a normal speed regime of driving
Axial play of the wheel (severe wear of the front wheel hub bearing or loosening of the hub bearing nut)	Tighten the wheel hub bearing nut; replace the bearing if necessary
Wear of suspension joints, deformation of suspension parts or the body	Replace hinges, deformed suspension parts, side members, body panels
Play in the steering gear (see also "Increased свободный steering play - леса»)	Replace worn hinges, tighten threaded connections
Shock absorber defective	Replace both shock absorbers (both struts)

INCREASED FREE PLAY OF THE STEERING WHEEL

The nuts securing the ball joints of the tie rods or the bolts securing the steering gear housing to the subframe have loosened	Tighten the nuts and bolts
Increased play in the ball joints of the tie rods	Replace the tie rod ends, ra-tie rods
Large lateral clearance between the pinion and the nut	Replace the steering gear

STEERING WHEEL TURNS WITH DIFFICULTY

Belt breakage or insufficient belt tension of the drive for auxiliary units (for vehicles with power steering)	Check the condition of the belt. Replace the belt

Cause of Failure	Remedy
Low fluid level in the power steering reservoir	Check the hydraulic system f or leaks. Refill the reservoir with fluid
Power steering pump malfunction steering control valve	Replace the pump, bleed the system
The bearing of the upper mount of the front suspension strut is damaged	Replace the mount bearing
Support bushing damaged — replace the damaged parts or the steering rack end stop or the steering gear assembly СТО ре	
Low tire pressure front wheels	Set the correct tire pressure
Tie-rod end joints are damaged	Replace the tie-rod ends
Bearings of the steering gear are damaged	Replace the bearings СТО или steering mechanism assembly
Front wheel alignment angles are incorrect	Adjust the alignment angles wheels СТО
Steering mechanism fasteners have loosened	Tighten the steering mounting bolts of the left mechanism to the subframe

UNEQUAL STEERING RESISTANCE OF THE STEERING WHEEL WITH THE ENGINE RUNNING

Presence of air in the power steering hydraulic system	Bleed the air from the hydraulic system темы
Insufficient pressure of the power steering fluid	Replace the power steering pump for the steering
Sticking of the spool valve in the distribution device of the left mechanism	Replace the steering mechanism

SQUEAKING, HIGH-PITCHED SQUEAL WHEN BRAKING

Maximum pad wear brake pads	Replace the brake pads (all on the same axle at the same time)
Severe contamination of the support surfaces of the pads in the caliper	Remove the pads and clean supporting surfaces of the caliper and pads
The brake pad lining has separated from the backing	Replace the pads (all at once on the same axle)
The return spring is loose or broken of the rear brake pads	Replace the spring

VIBRATION DURING BRAKING**

Brake disc deformation	Replace both discs
Increased wheel axial play	Tighten the wheel hub bearing nut; if necessary, replace the bearing

Cause of malfunction	Remedy Method
Brake drum ovality drum	Turn СТО or replace drum
The piston in the rear wheel cylinder is seized	Replace the wheel cylinder
The brake pad lining has separated from the backing plate	Replace the pads (simultaneously all on the same axis)
The retaining spring of the rear brake pads is weakened or broken	Replace the spring

VEHICLE PULLING OR SKIDDING DURING BRAKING

Piston seizure of the wheel cylinder	Replace the wheel cylinder
Blockage of brake lines: pipes or hoses	Replace damaged pipes and hoses
Lining separation from the ba- brake pad wear	Replace pads (at the same time all on the same axle)
Oil contamination of brakes discs, drums, linings of brake pads	Clean the oil-fouled discs and drums, replace the pads. Eliminate the cause of the oil contamination
Different tire pressures of the left and right wheels	Set the tire pressure to normal tire pressure
A significant difference in wear tire wear	Replace the worn tire
The pressure regulator or it s actuator in the rear wheel brake mechanisms is faulty	Replace the pressure reg ulator. Adjust the actuator
One of the circuits of the service brake system is leaking. Eliminate the fluid leak from the brake system and bleed the system (braking efficiency has significantly decreased)	
Brake disc deformation	Replace both discs
Wheel axial play	Tighten the wheel hub bearing nut; if necessary, replace the bearing
Shock absorber malfunction	Replace both shock absorbers (both struts)
Brake drum out of round	Bleed or replace the brake drum СТО
Uneven front suspension spring sag	Replace both springs
Wheel alignment angles are out of specification	Adjust the wheel alignment angles СТО

** Brake pedal vibration during hard braking on vehicles with ABS is a sign that the anti-lock braking system is activating.

Cause of Fault	Remedial Method
INCREASED BOL BRAKE PEDAL D (PEDAL "SOFT" OR "SINKS")	
Air in the brake system, leakage of brake fluid through hydraulic connection leaks, damage to the seals in the master brake cylinder, the pressure regulator, damage to brake pipes and hoses	Inspect all lines, their threaded connections and cylinders, eliminate any leaks. Restore t he normal fluid level in the hydraulic reservoir and bleed the system. If damage to brake hoses is found (cracks, bulges, or traces of brake fluid), replace the hoses. If defects in the master brake cylinder are suspected, replace it with a serviceable unit
Rubber cylinder seals swollen due to entry of oils, gasoline, etc., into the brake fluid. Replace cylinders and hoses, completely drain the brake fluid, flush the system with fresh fluid and bleed it	
Increased clearance between the wheel cylinders and the drum (replace components of the automatic clearance adjustment mechanism if the automatic adjustment mechanism is not functioning)	
One of the circuits is not working— of the service brake system— темы	Eliminate brake fluid leakage from the brake system; bleed the system
BRAKE PEDAL TRAVEL WITHIN NORMAL LIMITS (PEDAL "FIRM"), BUT THE CAR BRAKES POORLY	
Seizure of the wheel cylinder piston	Replace the wheel cylinder
Blockage of the brake lines: pipes (due to denting) or hoses (due to swelling or delamination of the rubber) tin) or hoses (due to s welling or delamination of the rubber)	Replace damaged pipes and hoses
Contamination of brake discs, drums, pad- surface of brake pads	Clean contaminated discs and drums, replace the pads. Eliminate the cause of contamination
Complete wear of pad linings (squealing of brakes) Replace the brake pads (replace all on one axle at the same time)	
Brake pad lining the lining has delaminated from the base	Replace the pads (all at once on the same axle)
The pressure regulator or its actuator in the rear-wheel braking mechanisms is faulty	Replace the pressure reg ulator. Adjust the actuator

Cause of malfunction	Remedial method
Vacuum booster is faulty or the check valve hose connecting the booster to the intake manifold is leaking or defective. Check the operation of the booster and the check valve. Replace the hose connecting the booster to the intake manifold and any defective parts.	
VEHICLE PULLING TO ONE WHEEL WITH THE BRAKE PEDAL RELEASED	
Seizure of the wheel cylinder piston wheel cylinder	Replace the wheel cylinder
Blockage of brake lines: Replace tubes (due to dents) or hoses (due to swelling or delamination of the rubber)	damaged tubes and hoses
Brake pad sticking due to heavy contamination of the caliper support surfaces: Remove the pads, clean the pad support and caliper support surfaces	
Separation of the rear brake pad lining	Replace the pads (all at once on the same axle)
The tensioning (return) spring of the rear brake shoes is loose or broken	Replace the tensioning spring
The mounting of the shoe guide to the steering knuckle is loose	Tighten the bolts
The parking brake is overtightened, the cables are jammed in the housings; lubricate them with engine oil, and if a cable sheath is damaged or the strands are frayed, replace the cable	Also replace the cable in cases of severe corrosion
WHEN THE PARKING BRAKE LEVER IS RELEASED THE WHEELS DO NOT RELEASE	
Incorrect adjustment of the parking brake mechanism	Adjust the mechanism
After a long stop, if the pads have stuck (or frozen) to the drum, try to gently pull the lever or cables (being careful not to tear off the brake linings) and turn the wheel. When parking the vehicle, avoid applying the brake too tightly if possible; instead, leave the transmission in gear.	
THE ANTI-LOCK BRAKE SYSTEM WARNING LIGHT IS ON IN THE INSTRUMENT PANEL	
The vehicle's on-board voltage is too low (below 10 V). The charge warning lamp in the instrument cluster should be illuminated. absence of charge in the storage battery	Repair the fault in the battery charging circuit.

Cause of malfunction	Remedial action
No fluid in the brake system hydraulic reservoir. In this case, the warning light for activation should be illuminated on the instrument cluster parking brake malfunction and insufficient level of brake fluid in the hydraulic drive reservoir	Check the hydraulic drive connections for leaks and repair the fault. Top up the brake system hydraulic drive reservoir with fluid
Fault in the electrical connections of ABS components	Check and, if necessary, restore the contacts in the ABS electrical circuits

Cause of malfunction	Remedial method
Blown fuse	Determine the cause of a blown F8 (50A) or F9 (25A) anti- lock fuse. Replace the blown fuse in the engine compartment fuse/relay box and inspect the locking system wiring
Faulty sensors	Check using diagnostic equipment or the ABS control unit for wheel speed sensor faults

Electrical equipment

Cause of Fault	Remedy
BATTERY See also "Engine and its systems": "Crankshaft does not turn with the starter"	
BATTERY CHARGE LOW	
The vehicle has not been used for an extended period	Charge the battery using a charger or start the engine from another vehicle's battery
The belt tension has loosened of the auxiliary units (alternator)	Tighten the belt
The alternator is faulty	See generator fault diagnostics
With the engine off many electrical consumers are operating (head unit of audio system, etc.)	Reduce the number of bat- manufacturers operating from a rechargeable battery
Damage to the insulation of electrical circuits, surface leakage current of the battery — Check the leakage current (no more than 10 mA with consumers disconnected), clean the battery surface.	Caution, acid!
Short circuit between the battery plates (electrolyte " boiling", local heating of the battery)	Replace the battery
GENERATOR	
CHARGER ABSENCE WARNING LIGHT IS ON OF THE BATTERY. VEHICLE ON-BOARD VOLTAGE IS BELOW 13.5 V (CHECK WITH A TESTER)	
The drive belt tension of the auxiliary units has weakened (generator)	Tighten the belt

Cause of malfunction	Remedial method
Voltage regulator malfunctioning voltage	Replace the voltage regulator
Rectifier diodes are dam- of the power unit	Replace the rectifier блок
Connection of the excitation winding leads to the slip rings is broken, or there is a short or open circuit in the winding	Replace the generator rotor or the entire alternator assembly
Open circuit or short in the stator winding, or its short to ground (when shorted, the generator howls)	Replace the stator or the entire alternator assembly
VEHICLE ON-BOARD SYSTEM VOLTAGE EXCEEDS 14.7 V (CHECK WITH A TESTER)	
Voltage regulator is damaged	Replace the voltage regulator
GENERATOR NOISE	
Generator bearings are damaged (squeal, howling). Noise remains when the wires are disconnected from the generator and disappears when the drive belt is removed	Replace the rear bearing, the front bearing with its cover, or the entire alternator assembly
Short circuit in the stator winding (howling). Noise disappears if the wires are disconnected from the generator	Replace the stator or the entire alternator assembly
A short circuit in one of the diodes. The noise stops if the wires are disconnected from the generator	Replace the rectifier unit

Cause of Fault	Remedy Method
LIGHTING AND LIGHT SIGNALING	
HEADLIGHT AND LAMP BULBS DO NOT LIGHT	
Filament burned out	Replace the bulb
The fuse has blown	Check the circuit protected by the blown fuse for any short to ground, then replace the fuse
Relay contacts are corroded, relay windings have burned out, switches are faulty	Clean the contacts, replace the relays and switches
TURN SIGNAL INDICATOR FLASHES AT DOUBLE FREQUENCY	
One of the turn signal bulbs has burned out	Replace the burned-out bulb
TURN SIGNAL SWITCH LEVER DOES NOT RETURN TO ITS ORIGINAL POSITION / STEERING COLUMN SWITCH LEVER IS NOT LATCHING	
Retainers are broken, the switch springs are lost	Replace the faulty switch
HEADLIGHT LENS IS FOGGING	
Between the housing and the lens, water is entering through cracks in the lens; smear the gaps with sealant, replace the cracked lens or the headlight assembly	
Water entered from the engine compartment side	Remove the bulb and drain the water. When pressure-washing the engine compartment, cover the headlights
WINDSHIELD WIPER	
WIPER MOTOR DOES NOT OPERATE, FUSE F01 (PASSENGER COMPARTMENT FUSE BOX) PROTECTING THE WIPER CIRCUIT SERVICEABLE	
Wires damaged, corroded, or their terminals not seated tightly	Crimp the terminals, replace faulty wires
Faulty steering column switch	Replace the faulty switch for the windshield wiper
The motor brushes are stuck, the commutator is heavily soiled or burnt	Replace the gearmotor
Open circuit in the armature winding of the motor	Replace the gearmotor
Control module malfunction	Replace the control module

Cause of malfunction	Remedial method
CLEANER ELECTRIC MOTOR NOT WORKING, FUSE F01 BLOWN (MOUNTING UNIT IN THE CABIN) WIPER CIRCUIT PROTECTION	
Wiper blades frozen to the glass	Turn off the wiper, carefully detach the blades from the glass, check the integrity of the rubber squeegee, and restore the mobility of the blade joints
Wiper blades catching on body parts	Check that the levers are installed correctly; straighten any deformed levers or replace the cleaner
Short circuit in the motor winding— of the electric motor	Replace the gearmotor
WIPER MOTOR DOES NOT OPERATE IN INTERMITTENT MODE	
Faulty switching block	Replace the switching block
The steering column switch is faulty— switch	Replace the steering column switch
WIPER MOTOR DOES NOT STOP IN INTERMITTENT MODE	
The contacts of the limit switch are oxidized or burnt contacts of the limit switch	Clean the contacts or replace the wiper motor gear reducer
BRUSHES STOP IN ARBITRARY POSITION	
The crank retaining nut on the shaft has loosened	After correctly positioning the crank, tighten the nut
The contact leaves of the limit switch do not press firmly against the motor gear	Bend the contact tabs of the limit switch
BRUSHES OPERATE OUT OF SYNC	
The lever mounting has loosened of one of the brushes on the shaft	Set the brush in the correct position and tighten the lever mounting nut
WIPER MOTOR RUNS BUT BRUSHES DO NOT MOVE	
The crankshaft securing nut on the gearbox shaft has come loose	After correctly positioning the crankshaft, tighten the nut
Gear teeth are crumbled.	Replace the gearmotor

Cause of Malfunction	Remedial Method

REAR WINDOW HEATING ELEMENT

INDIVIDUAL HEATING ELEMENT STRANDS NOT HEATING

Breaks in the rear window heating element strands	Restore the rear window heating element strands using a special conductive compound or replace the rear window with the heating element.

NONE OF THE HEATING ELEMENT STRANDS IS HEATING

The switch, relay, or rear-window heating fuse is faulty; wires are damaged; terminals are oxidized or poorly connected; or the contact has torn away from the window heating element.	Faulty switch, relay, fuse, wir- replace. Clean and crimp the terminals. Replace the window with the heating el- heating unit

HEATER FAN MOTOR NOT WORKING

Wires damaged, corroded, or their terminals are not securely attached terminals	Crimp and clean the terminals; replace any faulty wires
Relay K1 for the heater fan is faulty, or fuse F36 or F39 in the interior fuse/relay block has blown	Replace the faulty relay or the fuse
The heater fan motor is faulty. Replace the heater fan	
The heater fan mode switch is faulty	Replace the switch

HEATER BLOWER MOTOR DOES NOT WORK ON LOW SPEED

The auxiliary resistor has burned out	Replace the resistor
Faulty switch Replace the heater fan mode switch	

INDICATORS AND INSTRUMENTS

COOLANT TEMPERATURE GAUGE OR FUEL LEVEL GAUGE DOES NOT WORK

Indicator malfunction	Replace the instrument cluster
Indicator sensor malfunction Replace the indicator sensor	

Cause of malfunction	Remedy
Wires damaged, corroded, or their terminals are loose — crimp the terminals, replace the faulty wires or terminals	

CONTINUOUSLY LIT FUEL RESERVE WARNING LIGHT

Fuel level sensor resistor faulty	Replace the gauge sensor fuel level

SIGNAL INDICATORS DO NOT LIGHT

Indicator faulty	Replace the instrument cluster
Corresponding indicator sensor faulty indicator sensor	Replace the indicator sensor
Wires are damaged, corroded, or their terminals are not firmly attached	Crimp the terminals; replace the faulty wires

SPEEDOMETER DOES NOT WORK

Speed sensor is faulty	Replace the speed sensor
Speedometer is faulty	Replace the instrument cluster

TACHOMETER NOT WORKING

Power circuits of the instrument cluster are damaged, control circuit of the tachometer	Crimp the terminals, replace faulty wires, instrument cluster
The ECU does not output a signal to the tachometer	Replace the faulty ECU
Tachometer malfunction	Replace the instrument cluster

SOUND SIGNAL

SIGNAL DOES NOT WORK

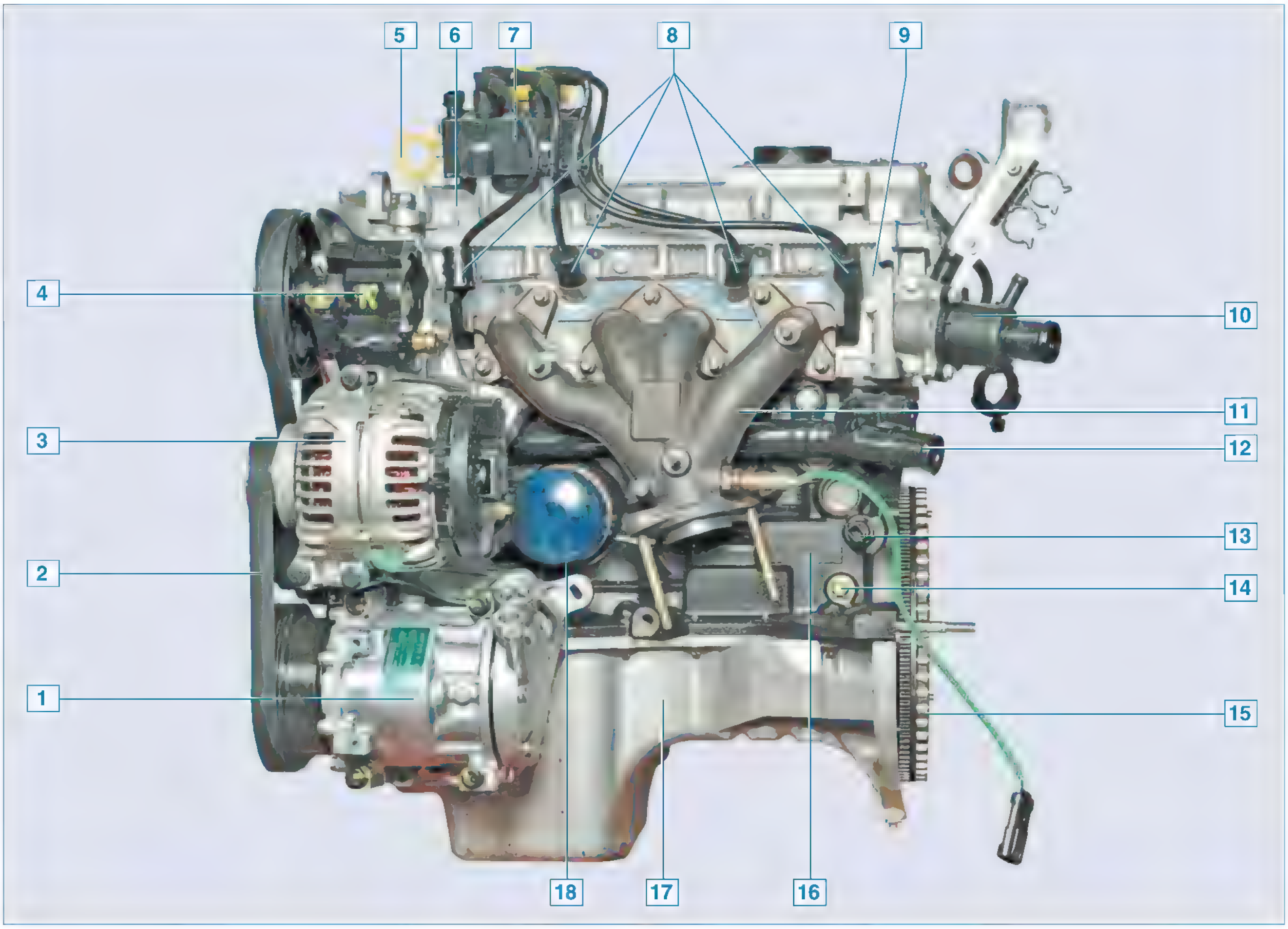
The signal is faulty, its sound is distorted; try restoring the switch, fuse F17 is blown, the signal housing is cracked. Wires are damaged, corroded, or poorly connected at their terminals.	Strip and crimp the wire terminals. Faulty horn, switch, wiring, blown fuse — replace

WEAK, HOARSE HORN SOUND

Faulty horn, damaged wiring, oxidized or poorly connected terminals. Adjust the tone by turning the screw on the horn housing. Clean and crimp those wire terminals. Faulty horn, switch, wiring — replace

1.4–1.6 (8V)

Description of the construction



Engine (front view in the direction of travel): **1** – air conditioning compressor; **2** – auxiliary drive belt; **3** – alternator; **4** – power steering pump; **5** – oil level indicator (dipstick);**6** – cylinder head cover; **7** – ignition coil; **8** – high-tension lead ends; **9** – cylinder head; **10** – thermostat housing; **11** – exhaust manifold; **12** – coolant pump pipe; **13** – low oil pressure warning sensor; **14** – service plug; **15** – flywheel; **16** – engine block; **17** – oil pan;**18** – oil filter

The K7J and K7M engines are identical in design and differ only in displacement. The K7J has a displacement of 1.4 L, while the K7M is 1.6 L. The increase in displacement is achieved by a larger crankshaft radius and, consequently, a greater piston stroke.

of the crankshaft and, therefore, a greater piston stroke.

Both engines are gasoline, four-stroke, four-cylinder, in-line, eight-valve, with an overhead camshaft.

Firing order: 1–3–4–2, counted from the flywheel.

The fuel system is multi-point fuel injection (Euro 4 emissions standards).

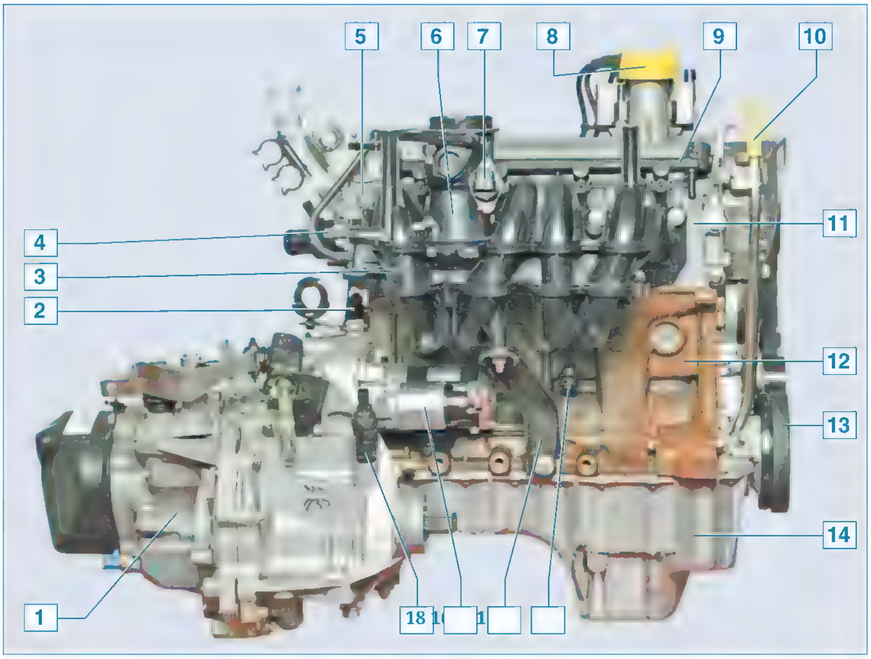
The engine, together with the gearbox and clutch, forms the power unit — a single block mounted in the engine bay on three flexible rubber-metal mounts. The right mount is attached to a bracket on the upper timing-belt cover, while the left and rear mounts are attached to the transmission housing.

At the front of the engine (in the direction of vehicle travel) are located: the exhaust manifold; the oil filter; the low oil pressure warning switch; the coolant inlet pipe from the pump; the spark plugs; the alternator; the power steering pump; and the air conditioning compressor.

At the rear of the engine are located: the intake manifold with the absolute pressure and intake air temperature sensors; the throttle body with the throttle position sensor and idle speed control; the fuel rail with injectors; the knock sensor; the starter; and the oil level gauge.

On the right – the coolant pump; the drive for the valve timing mechanism and the coolant pump (by toothed belt); the drive for auxiliary units (by serpentine belt). On the left are: the flywheel; the thermostat; the crankshaft position sensor; the coolant temperature sensor.

On top – the ignition coil; the oil filler neck.
The engine block is cast iron, with the cylinders bored directly in the block.
Five main bearing supports with removable caps, which are fastened to the block with special bolts, are located in the lower part of the cylinder block. The holes in the cylinder block for the bearings are machined with the caps installed, so the caps are not interchangeable and are marked on the outer surface for identification (the counting of caps is done from the flywheel side).



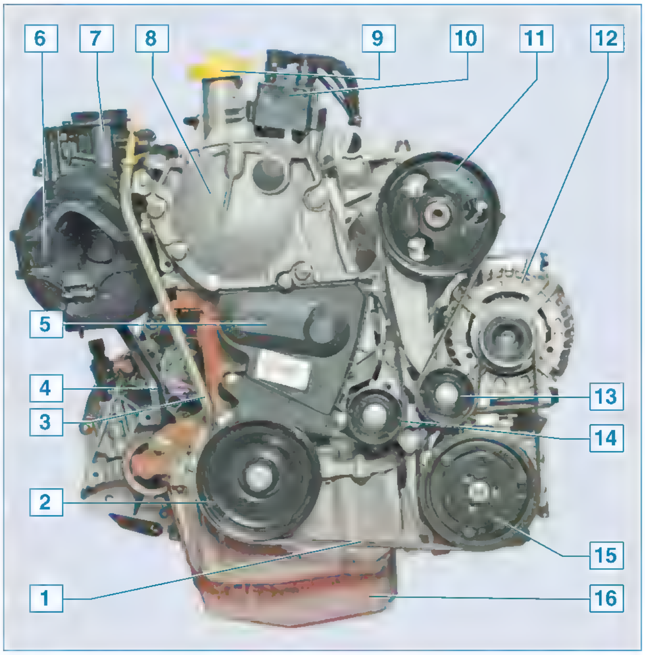
Power unit (view from the rear in the direction of travel): 1 – gearbox; **2** – crankshaft position sensor; **3** – intake manifold;**4** – intake manifold absolute air pressure sensor; **5** – intake air temperature sensor; **6** – throttle assembly; **7** – idle speed regulator;**8** – oil filler cap; **9** – fuel rail; **10** – oil level indicator (dipstick); **11** – cylinder head; **12** – engine block; **13** – accessory drive belt; **14** – oil pan; **15** – knock sensor; **16** – intake manifold support bracket; **17** – starter; **18** – vehicle speed sensor

Recesses for thrust half-rings that prevent axial movement of the crankshaft are made on the end faces of the center support.

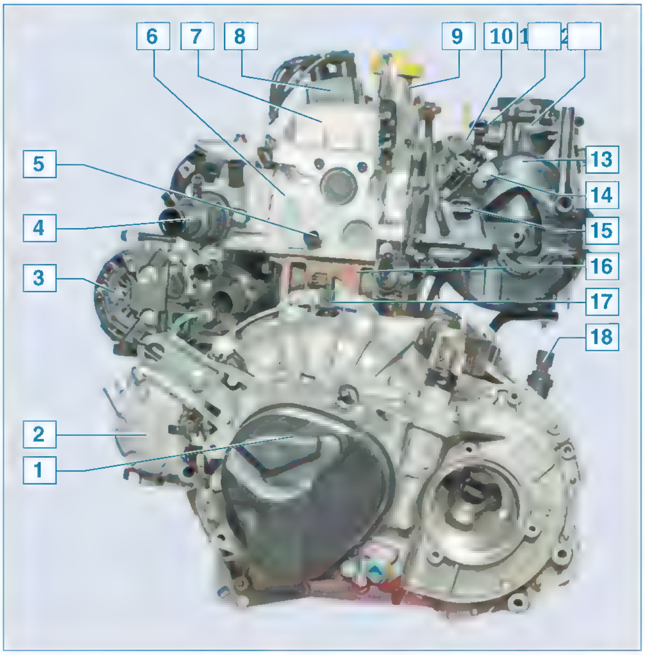
Main and connecting-rod bearing shells of the crankshaft are steel, thin-walled with an antifriction coating applied to the working surfaces. The crankshaft has five main

with four connecting-rod journals. The shaft is equipped with four counterweights cast together with it. The counterweights are formed on the extensions of the crankshaft cheeks. The counterweights are intended to balance the forces and moments of inertia that arise during the movement of the crank-and-rod mechanism while the engine is running. For supplying oil from the main journals to the rod journals, there are oil passages formed in the journals and cheeks of the shaft. On the front end (snout) of the crankshaft are mounted: the sprocket for driving the oil pump, the toothed pulley for driving the valve timing mechanism (VVT), and the pulley for driving auxiliary units. The toothed pulley is secured on the shaft by a projection that fits into a slot on the snout of the crankshaft and prevents the pulley from turning. The pulley for driving the auxiliary units is secured on the shaft in the same way.

The flywheel is attached to the crankshaft flange with seven bolts. It is cast iron and has a press-fitted steel ring gear for starter engagement. In addition, the flywheel has a toothed ring for the crankshaft position sensor.



Power unit (view from the right in the direction of vehicle travel): 1 – auxiliary drive belt;**2** – auxiliary drive pulley; **3** – oil level dipstick guide tube; **4** – intake manifold support bracket; **5** – lower cover of the timing belt; **6** – intake manifold;**7** – throttle assembly; **8** – upper cover of the timing belt; **9** – oil filler cap; **10** – ignition coil; **11** – power steering pump pulley; **12** – alternator; **13** – belt idler; **14** – belt tensioner pulley; **15** – air conditioning compressor pulley; **16** – oil pan



Power unit (view from the left in the direction of vehicle travel): 1 – transmission; **2** – air conditioner compressor; **3** – alternator; **4** – thermostat housing; **5** – coolant temperature sensor; **6** – cylinder head; **7** – cylinder head cover; **8** – ignition coil; **9** – oil filler neck; **10** – fuel rail; **11** – throttle position sensor;**12** – throttle assembly; **13** – intake manifold; **14** – intake air temperature sensor; **15** – intake manifold absolute pressure sensor; **16** – engine block; **17** – crankshaft position sensor; **18** – vehicle speed sensor

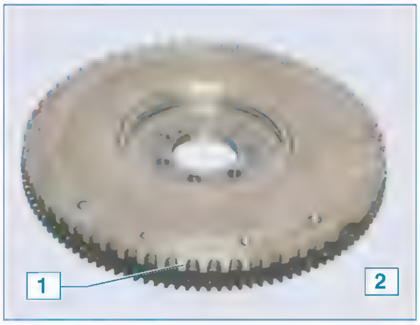
Connecting rods – steel, I-beam section, machined together with their caps. The caps are fastened to the connecting rods with special bolts and nuts.

Wrist pin – steel, tubular section. The pin, pressed into the small end of the connecting rod, rotates freely in the piston bosses.

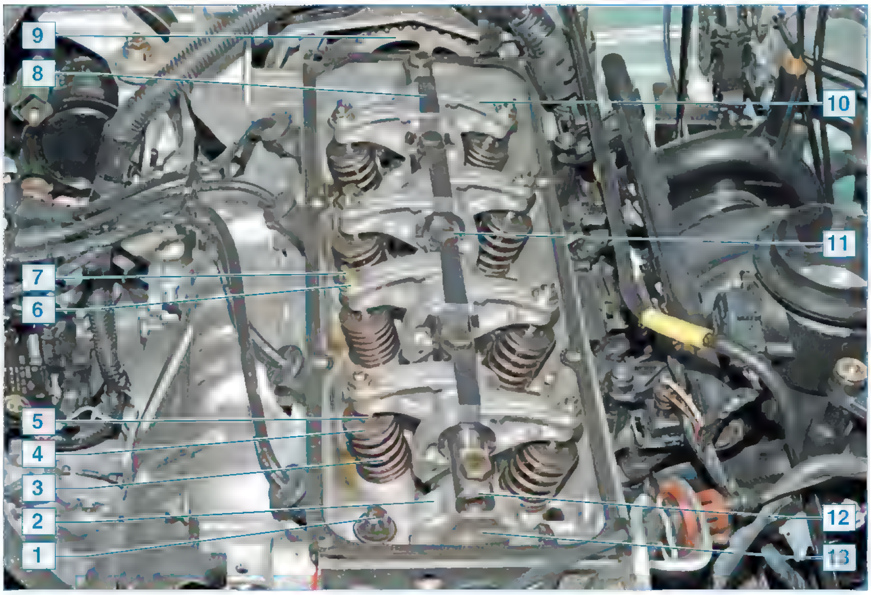
The piston is made of an aluminum alloy. The piston skirt has a complex shape: in longitudinal section it is barrel-shaped, and in cross-section it is oval. Three grooves for piston rings are machined in the upper part of the piston. The two upper piston rings are compression rings, and the lower one is an oil-control ring. The compression rings prevent gases from leaking from the cylinder into the crankcase of the engine and help transfer heat from the piston to the cylinder. The oil-control ring removes excess oil from the cylinder walls as the piston moves.

The cylinder head is made of an aluminum alloy and is common to all four cylinders. It is centered on the block by two dowel pins and fastened with ten bolts. A non-shrinking metal gasket is installed between the block and the head. Five bearings (supports) for the camshaft are located in the upper part of the cylinder head. The supports are non-separable, and the camshaft is inserted into them from the timing drive side. The camshaft is driven by a toothed belt from the crankshaft.

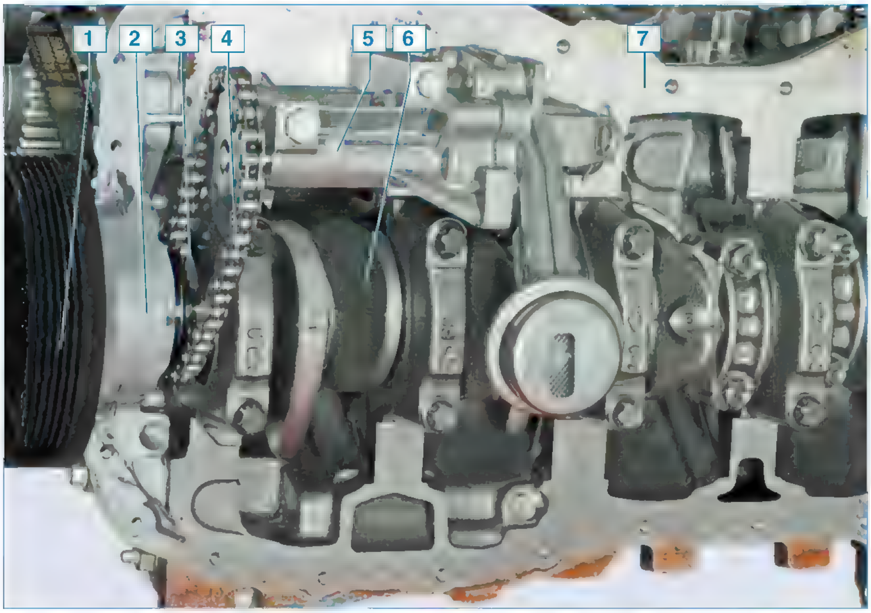
A groove is made in the outer bearing journal of the camshaft (flywheel side) into which an end flange engages to prevent axial movement of the shaft. The end flange is attached to the cylinder head.



Flywheel: 1 – ring gear for the crankshaft position sensor; **2** – ring gear for engine starting

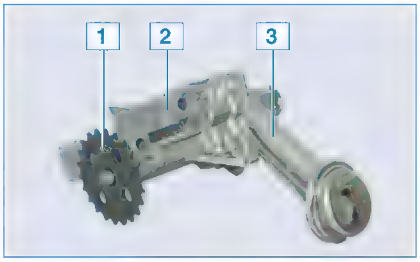


Cylinder head (rocker cover removed): **1** – cylinder head fastening bolt; **2** – camshaft support; **3** – valve spring; **4** – spring retainer; **5** – valve keepers; **6** – locknut; **7** – adjustment screw; **8** – bracket; **9** – camshaft pulley; **10** – valve rocker; **11** – bolt securing the rocker shaft; **12** – rocker shaft; **13** – camshaft thrust flange



Oil pump drive (engine oil pan removed): **1** – auxiliary drive pulley; **2** – front cover of the cylinder block; **3** – drive sprocket of the pump; **4** – drive chain; **5** – oil pump; **6** – crankshaft; **7** – cylinder block

with two screws. An axle for the valve rockers is attached to the camshaft supports from above with five bolts. The rockers are prevented from shifting along the axis with two brackets that are attached by bolts fastening the rocker arm shaft. Screws are threaded into the rocker arms to adjust the thermal clearances in the valve drive.



Oil pump: **1** – driven drive sprocket; **2** – pump housing; **3** – pump housing cover with oil pickup

The adjustment screws are locked against turning with locknuts. The valve seats and guide sleeves are pressed into the cylinder head. Oil-deflecting caps are fitted over the valve guide sleeves from above. The valves are steel and arranged in two rows, inclined to the plane passing through the cylinder axes. The exhaust valves are located at the front (in the direction of travel), and the intake valves at the rear. The intake valve head is larger than the exhaust valve head.

The valve is opened by a rocker, one end of which rests on the cam of the camshaft, while the other, via an adjusting screw, rests against the end of the valve stem. The valve is closed by the action of a spring. Its lower end rests on a washer and its upper end on a retainer plate, which is held in place by two keepers. The assembled keepers are tapered on the outside and have supporting collars on the inside that fit into a groove on the valve stem.

Engine lubrication is combined. Under pressure are lubricated the main and connecting-rod bearings of the crankshaft and the bearings of the camshaft. Other engine components are lubricated by splash. Pressure in the lubrication system is generated by a gear oil pump located at the front of the oil pan and attached to the cylinder block. The oil pump is driven by a chain from the crankshaft.

The drive sprocket of the pump is mounted on the crankshaft under the front cover of the cylinder block. A cylindrical collar is machined on the sprocket, against which the front crankshaft oil seal operates. The sprocket is fitted to the crankshaft without interference fit and is not fixed with a key. During engine assembly the pump drive sprocket is clamped between the timing drive toothed pulley and the crankshaft flange as the assembly of parts is drawn together by the bolt that secures the accessory drive pulley. Torque from the crankshaft is transmitted to the sprocket only by frictional forces between the end faces of the sprocket, the toothed pulley and the crankshaft.

If the mounting bolt of the accessory drive pulley is loosened, the drive sprocket for the oil pump may begin to slip on the crankshaft and the engine oil pressure will drop.

The oil intake is made as a single piece with the oil pump housing cover. The cover is fastened to the pump housing with five screws. The relief valve is located in the pump housing cover and is held in place by a spring retainer to prevent it from falling out.

Oil from the pump passes through the oil filter and enters the oil gallery machined in the engine block. The oil filter is full-flow and non-serviceable. From the gallery the oil is supplied to the main bearings of the crankshaft and then, via passages in the crankshaft, to the connecting-rod bearings. Through a vertical passage in the engine block, oil from the gallery is fed to the cylinder head — to the center support of the camshaft. In the center support journal of the camshaft there is an annular groove through which the oil flows to the hollow bolt securing the rocker shaft. From there, through the hollow bolt, the oil enters the passage in the rocker shaft, then to the rockers and, via other hollow bolts securing the shaft, to the remaining supports of the camshaft.

Holes are made in the rocker arms through which oil is sprayed onto the camshaft lobes. From the cylinder head, oil drains through vertical passages into the engine crankcase oil pan.

The crankcase ventilation system is closed and forced, with gases drawn off through an oil separator (in the cylinder head cover) that removes oil particles from the crankcase gases. Gases from the lower part of the crankcase pass through internal passages in the cylinder head into the head cover and then, via two hoses (the main circuit and the idle circuit), enter the engine intake manifold.

Through the main contour hose, crankcase gases are routed to the area in front of the throttle valve under partial and full load conditions.

Through the idle circuit hose, crankcase gases are routed to the area behind the throttle valve during partial and full load conditions as well as during idle.

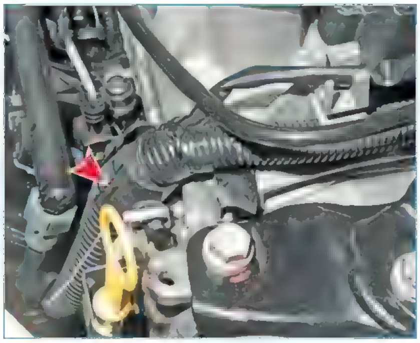
The control, fuel, cooling, and exhaust systems are described in the corresponding chapters.

Replacing the cylinder head cover gasket

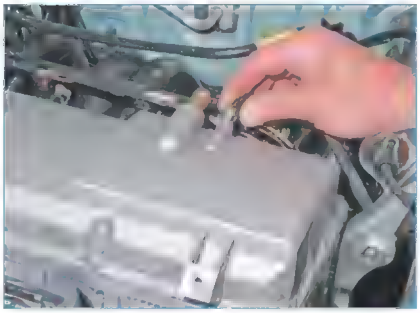
Replace the gasket if oil begins to leak at the joint with the cylinder head, or whenever the cover is removed.

Perform the work on a cold engine. Remove the air filter (see “Removing the air filter,” p. 116).

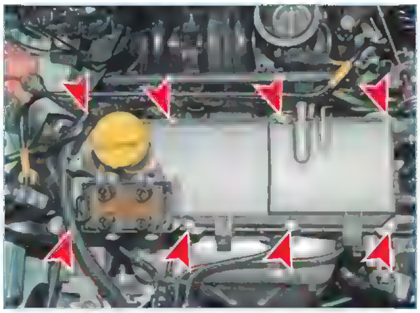
Disconnect the wiring harness plug from the ignition coil and the high-voltage wire terminals (see “Removing the ignition coil,” p. 110).



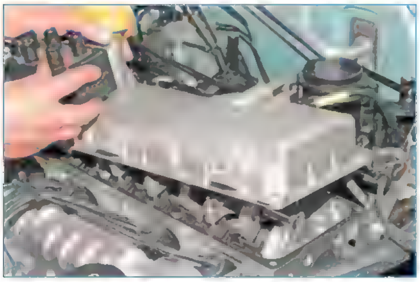
Disconnect the wiring harness retaining clip.



Disconnect the crankcase ventilation hose of the idle circuit from the fitting on the cylinder head cover.

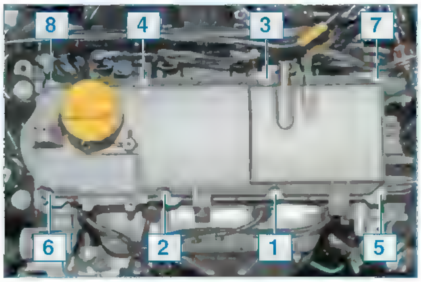


Using an 8 mm socket, unscrew the eight bolts securing the cylinder head cover.



Remove the cylinder head cover with the ignition coil.

Remove the cover gasket. After cleaning the mating surfaces of the cover and the cylinder head of oil and dirt, install a new gasket and reassemble in reverse order. Tighten the cover mounting bolts to the specified torque (see " Appendices", p. 315) in the sequence shown.



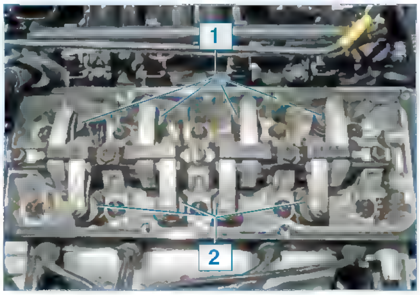
Bolt tightening sequence for the cylinder head cover.

Inspection and adjustment of valve clearance

We perform the work when characteristic "ticking" knocks appear in the area of the cylinder head. They occur at a frequency that is half the crankshaft rotational speed. These knocks are mainly the result of wear of the valve-train components and the associated increase in valve-train clearances. The knocks are clearly audible when the engine is idling.

It is also recommended to check the clearances after the vehicle has run more than 100,000 km. Perform the work on a cold engine.

Remove the cylinder head cover (see “Replacing the cylinder head cover gasket,” p. 89).

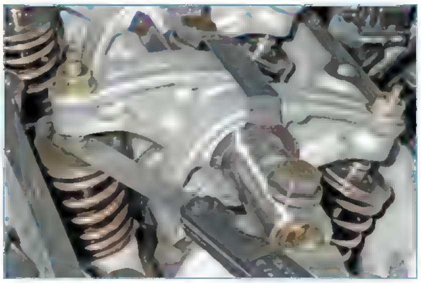


Valve arrangement in the cylinder head: 1 – row of intake valves; **2** – row of exhaust valves

Remove the upper timing belt cover and, using the mark on the camshaft timing pulley, set the piston of the first cylinder to TDC at the end of the compression stroke (see “ Inspection and replacement of the timing belt for the 1.4–1.6 (8V) engine,” p. 34).

Cylinder numbering is counted from the flywheel.

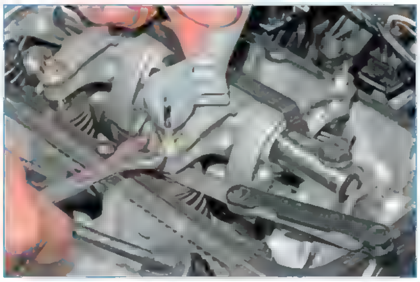
Then, in turn, check and, if necessary, adjust the clearances in the drive of the intake and exhaust valves of the 1st cylinder. When checking (with the crankshaft and camshaft in this position), the rocker toe ends of those valves should face the rears — the cylindrical parts of the cams of the camshaft. In doing so, the rockers may pivot on their shafts within the limits of the clearance in the drive.



Using flat feeler gauges from the set, check the valve clearance between the valve stem ends and the adjusting screw.

The clearance should be within $0{,}2^{+0{,}05}_{-0{,}075}$ mm for the intake valves and $0{,}4^{+0{,}05}_{-0{,}075}$ mm for the exhaust valves. The feeler gauge should move in the gap with slight resistance.

If the clearance value (feeler gauge thickness) differs from the required value...



...use a 10 mm wrench to loosen the locknut on the adjusting screw, holding the screw by the flats (width – 3 mm) with an adjustable wrench. Then, by turning the adjusting screw, set the required clearance. Tighten the locknut while holding the adjusting screw with the wrench. Check the clearance again and repeat the adjustment if necessary.

Rotate the crankshaft sequentially clockwise using the accessory drive pulley retaining bolt for 180°, check and, if necessary, adjust the valve clearance in the valve train of cylinders 3, 4, and 2. After completing the valve clearance adjustments, reinstall the removed parts in the reverse order.

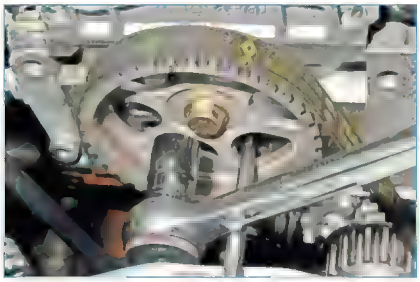
Replacing the camshaft oil seal

Assess the condition of the camshaft seal and, if necessary, replace it when performing the scheduled inspection of the timing belt drive.

Perform the work in an inspection pit or on a ramp.
Replace the seal if there are traces of engine oil under the camshaft timing pulley or on the timing belt.

If oil leakage through the camshaft seal is found, it is recommended to replace the timing belt, because oil on the belt and the camshaft and crankshaft pulleys will cause the belt to fail prematurely. Before installing a new belt, thoroughly wipe the pulleys with a cloth dampened with gasoline.

Remove the upper and lower covers of the timing belt drive and, turning the crankshaft, align the crankshaft and camshaft to TDC of the compression stroke of cylinder No. 1 using the mark on the camshaft pulley (see “ Inspection and replacement of the timing belt drive of the 1.4–1.6 (8V) engine”, p. 34).

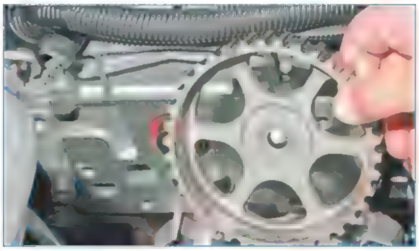


Using a 16 mm socket, loosen the bolt securing the timing camshaft sprocket while preventing the camshaft from turning by holding it with a screwdriver inserted through the sprocket hole into the recess in the cylinder head.

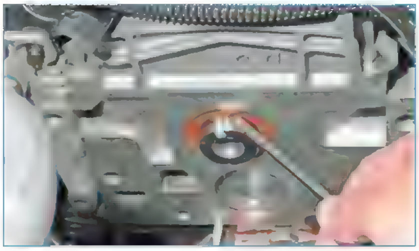
Remove the accessory drive belt (see “Replacing the accessory drive belt for 1.4–1.6 engines (8V)”, p. 32). After loosening the timing belt tensioner, remove the belt from the camshaft sprocket (see “ Inspecting and replacing the timing belt for 1.4–1.6 engines (8V)”, p. 34).

After removing the belt from the camshaft toothed pulley, do not rotate the crankshaft or camshaft so as not to disturb the engine's valve timing.

After loosening the bolt securing the camshaft toothed pulley...



...remove the pulley.

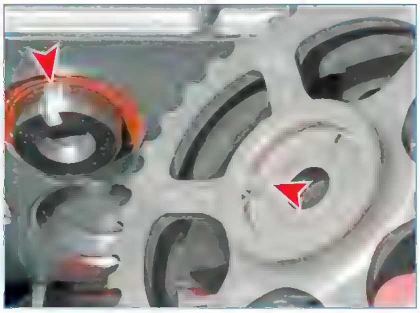


Pry up with a screwdriver...

...extract the oil seal from the cylinder head bore.
Apply a thin layer of engine oil to the sealing lip of the new seal...

...we fit the oil seal onto the distributor shaft nose.

We press the oil seal in using an appropriate-diameter tool head or drift.



Install the timing gear onto the camshaft so that the projection on the gear engages the slot on the nose of the camshaft.

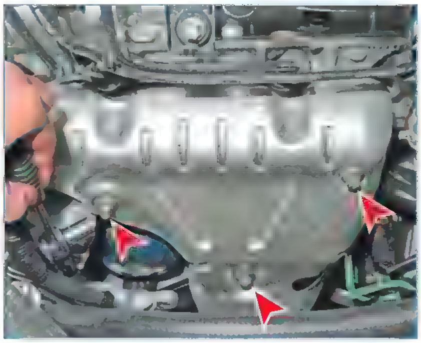
Reassemble in the reverse order of disassembly.
Adjust the tension of the timing belt (see “Inspection and replacement of the timing belt for 1.4–1.6 engines (8V)”, p. 34).

Replacing the exhaust manifold gasket

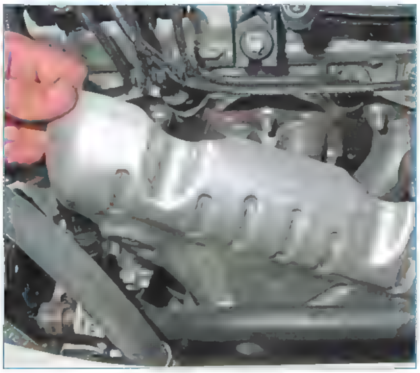
This procedure is carried out when replacing the gasket or during engine repairs that require removal of the exhaust manifold.
Work is carried out in the inspection pit or on the ramp.
The junction of the exhaust manifold with the head mounting surface

the cylinder block is sealed with a thin metal gasket.
If the gasket has burned through or the exhaust manifold mounting nuts have loosened, exhaust gases can escape through that joint to the outside, accompanied by a characteristic sound. If tightening the exhaust manifold mounting nuts does not eliminate the defect, the gasket must be replaced. To do this, disconnect the downpipe from the exhaust manifold (see "Removing the exhaust system", p. 132).

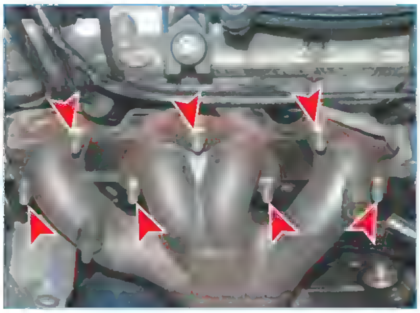
Before loosening the nuts that secure the heat shield, the threaded connections with the studs should be wetted with a penetrating fluid such as WD-400.



Using a 10 mm socket, loosen the three nuts securing the heat shield...

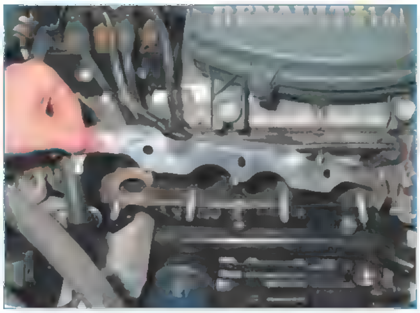


...and remove the shield. Soak the threaded connections of the exhaust manifold nuts and studs with a penetrating oil such as WD-40. After waiting about 5 minutes...

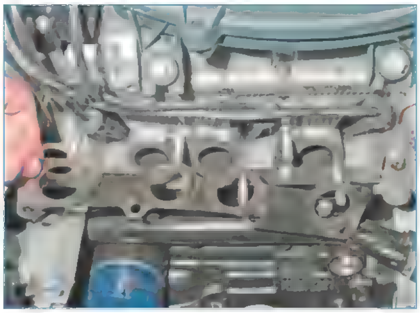


...with a 10 mm socket, loosen the seven nuts securing the exhaust manifold.

Remove the exhaust manifold.



Remove the heat shield...



...and the exhaust manifold gasket.
Before installation, clean the mating surfaces of the cylinder head and the exhaust manifold of carbon deposits.

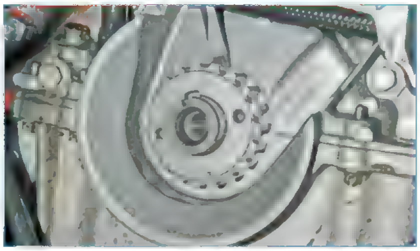
When installing a new gasket, reassemble in the reverse order. Before tightening the nuts that secure the exhaust manifold onto the cylinder head studs, apply graphite lubricant.

Replacement of the front crankshaft oil seal

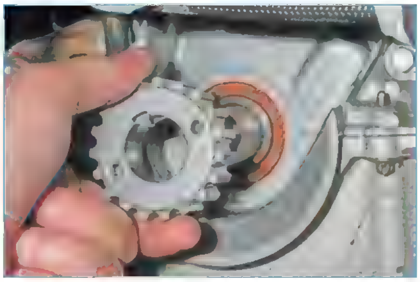
Replace the front crankshaft oil seal if oil traces appear on the engine sump wall or under the accessory drive pulley. Perform the work over an inspection pit or on a service ramp.

Remove the timing belt (see “Inspection and replacement of the engine timing belt 1.4–1.6 (8V)”, p. 34).

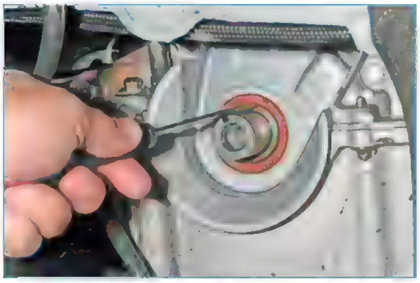
After removing the belt do not rotate the crankshaft or camshafts so as not to disturb the engine’s valve timing.



Pry up the toothed crankshaft pulley with a slotted screwdriver...

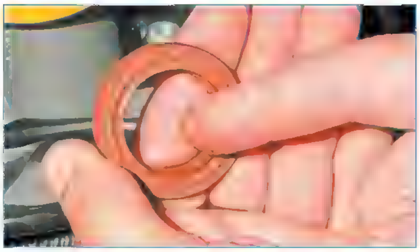


...and remove the pulley from the tip of the crankshaft.

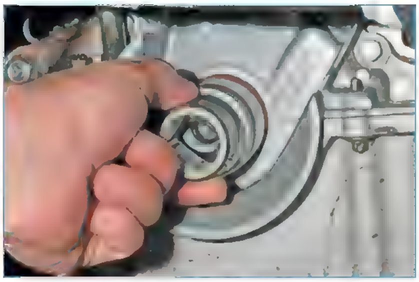


Pry out the seal with a screwdriver...

...remove it from the seating bore- in the front cover of the cylinder block- ров.

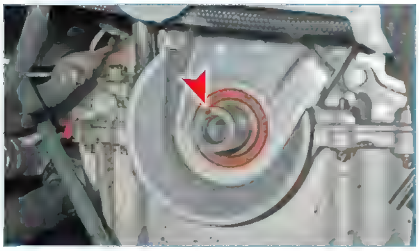


Apply a thin layer of engine oil to the working edge of the new seal...



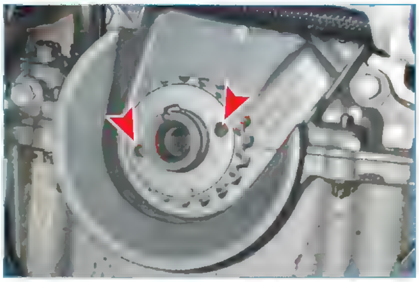
...press the seal in using a tool head or a length of pipe of the appropriate size.

Press the oil seal in to the same depth to which the old seal was pressed. When installing the toothed pulley, the protrusion in its bore (serving as a key) must...



...engage in the groove on the crankshaft snout.

Meanwhile...



...the threaded holes on the pulley face must be turned outward.

Continue assembly in the...

in reverse order.

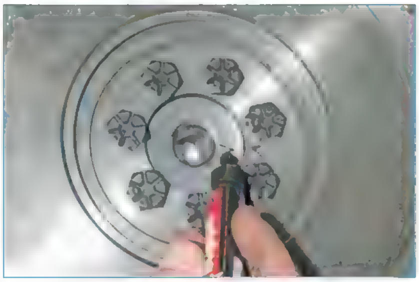
Adjust the timing-belt tension (see " Checking the condition and replacing the timing-belt on 1.4–1.6 (8V) engines", p. 34).

Replacing the crankshaft rear oil seal

Replace the rear crankshaft oil s eal if there is a high engine oil consumption and signs of leakage around the joint of the oil pan of the engine and the clutch housing.

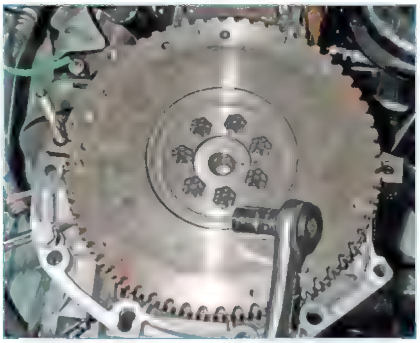
Perform the work in an inspection pit or on a service ramp.

Remove the gearbox (see “Removing the gearbox,” p. 189), the housing and the driven clutch disc (see “Removing clutch components,” p. 184).

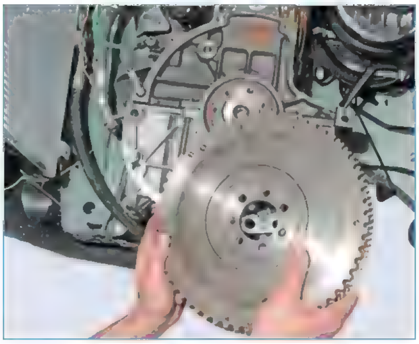


Mark the position of the flywheel relative to the crankshaft with a marker.

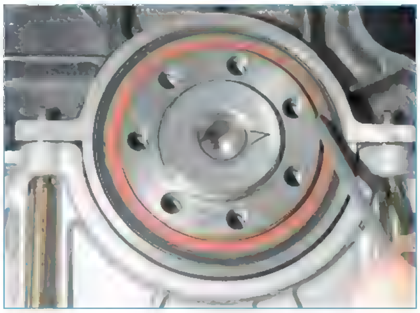
Screw a gearbox mounting bolt into the threaded hole in the cylinder block and lock the flywheel from turning with a power splined screwdriver (or a pry bar) by inserting it between the flywheel teeth and bracing it against the bolt.



Using a 17 mm socket, loosen the seven bolts securing the flywheel...



...and remove the flywheel.



Pry up the seal with a slotted screwdriver...

seal...

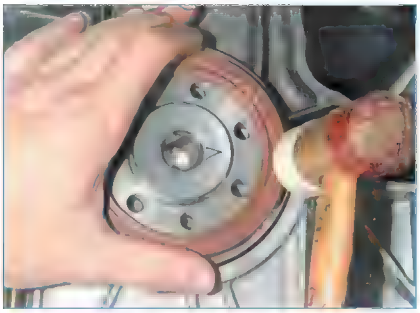
...we extract it from the mounting socket.

Apply a thin layer of motor oil to the working edge of the new seal

oil to the working edge of the new seal. When fitting the seal onto the crankshaft flange, use a thin-slotted

screwdriver to carefully tuck it in.

the working edge of the seal on the flange.



Using the old seal as a guide, press in the new seal. Install the flywheel according to the marks previously applied. Before tightening the flywheel mounting bolts, apply a locking sealant to their threaded portion. Screw in and evenly tighten the bolts to the specified torque (see "Appendices", p. 315).

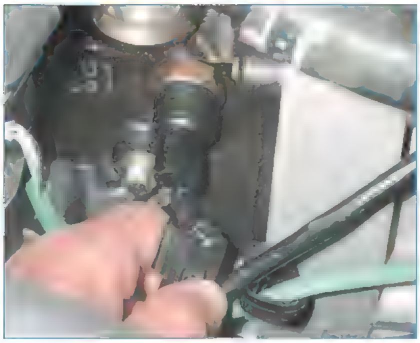
Reassemble in the reverse order.

Replacement of the low oil pressure warning sensor

Replace the sensor if it fails.

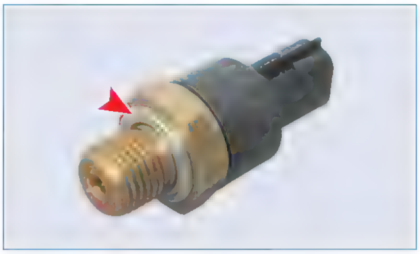
The sensor is screwed into a hole located in the lower part of the front wall of the engine block, under the spark plug of the No. 1 cylinder.

Pressing the wire connector latch...



...disconnect the connector from the sensor.

Use a wrench or a deep socket size 22 to unscrew the sensor.



The sensor connection to the cylinder block is sealed with an aluminum ring.

When installing the sensor, screw it into the cylinder block hole by hand, then tighten it with a tool. Connect the wire plug to the sensor.

Replacing the oil pan gasket

Replace the oil pan gasket if oil leaks occur at the mating surface between the pan and the engine block, and also whenever the pan is removed during engine repairs.

Perform the work over an inspection pit or on a service ramp.

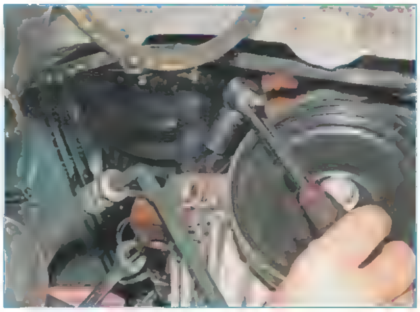
We demonstrate the procedures on a vehicle equipped with ABS and air conditioning.

Remove the powertrain shield. Drain the engine oil.

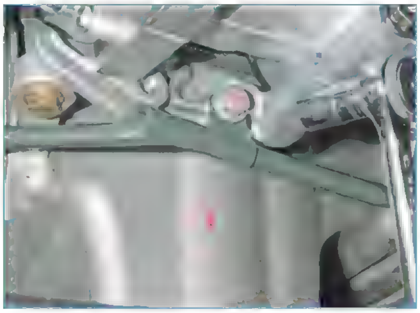
Disconnect the intake pipe from the exhaust manifold. Remove the rear engine mount. Unscrew the three bolts securing the front bumper to the subframe (see "Removing the front bumper on the Logan vehicle", p. 286).

Loosen the rear subframe mounting bolts by 3–4 turns (see “Removing the subframe,” p. 204).

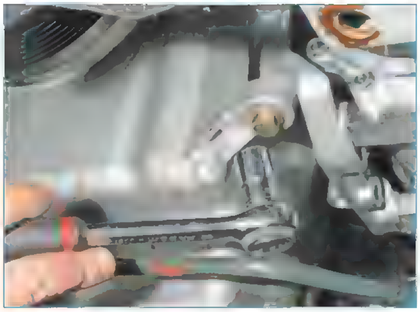
After loosening the bolts that secure the two subframe brackets to the body (see “Removing the control arm,” p. 203) and the bolts of the front subframe mounting to the body (see “Removing the subframe,” p. 204), lower the front part of the subframe onto an adjustable support.



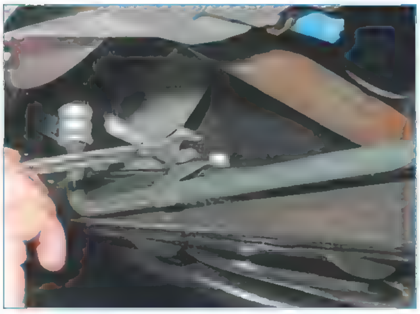
Using a 13 mm socket, loosen the nut on the bolt that secures the power steering hose bracket to the engine block, holding the bolt to prevent it from turning with a wrench of the same size.



Using a 13 mm socket, loosen the bolt securing the power steering hose bracket to the air conditioning compressor bracket.

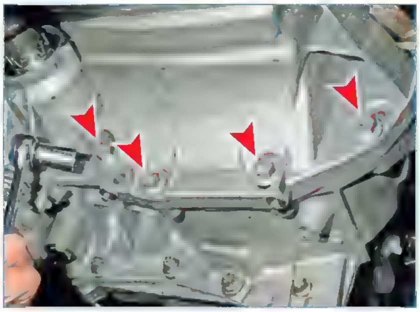


Using a 13 mm socket, unscrew the bolt securing the oil pan to the air conditioning compressor bracket.

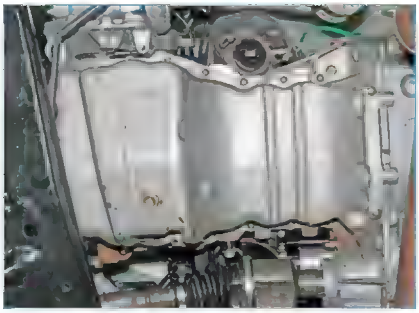


From the left side of the subframe, use a 10 mm wrench to loosen the nut securing the power steering pipe bracket to the subframe.

Remove the power steering pipe bracket from the stud.

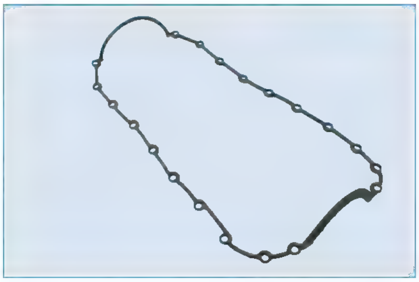


Use a 13 mm socket to loosen the four bolts securing the oil pan to the gearbox.

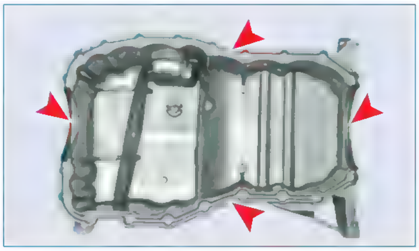


Use a 10 mm socket to loosen the 20 bolts securing the oil pan to the engine block.

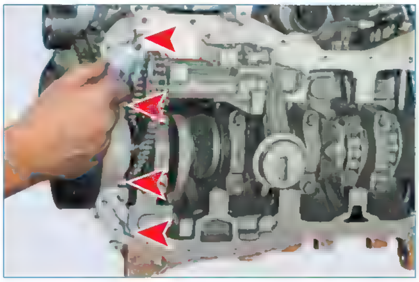
Pull the subframe downward, remove the oil pan, and withdraw it from behind the subframe.



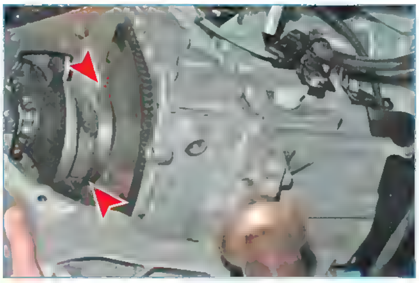
Remove the sealing gasket from the oil pan grooves. Clean the mating surfaces of the cylinder block and oil pan from residual sealant and oil. Flush the inside surface of the oil pan with kerosene. Place the new gasket...



...into the oil pan grooves.
Before installing the oil pan, apply a thin bead of sealant...

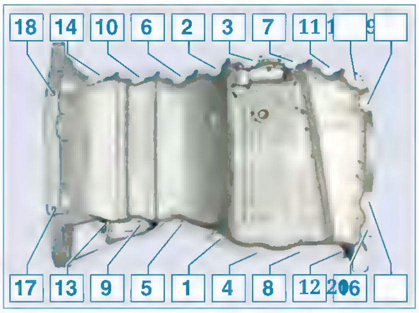


...in the area of the front cover of the cylinder block (shown on a removed engine for clarity)...



...and in the area of the cap of the No. 1 main bearing.

Install the oil pan and tighten its retaining bolts.

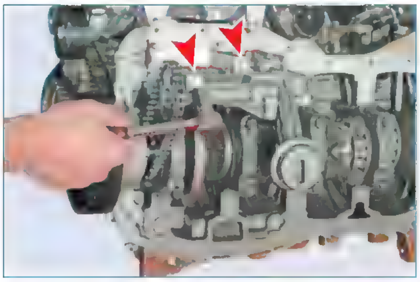


Tighten the oil pan mounting bolts to the specified torque (see "Appendices", p. 315) in the following order. Perform further assembly in reverse sequence.

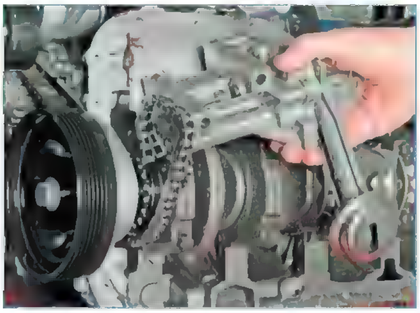
Removal of the oil pump

One cause of reduced oil pressure in the engine (indicated by the oil pressure warning light in the instrument cluster) may be a fault in the oil pump. This defect can be caused by clogging of the oil pickup screen, a malfunctioning relief valve, or damage or severe wear of the pump components. In that case the pump must be removed and inspected. If the pickup screen is contaminated, it should be cleaned and rinsed in petrol. The pump should also be removed when replacing its drive chain if the chain has stretched significantly or if it produces a characteristic noise while the engine is running.

Work is carried out over an inspection pit or on a ramp. Remove the oil pan (see " Replacing the oil pan gasket," p. 94).



Using a 13 mm socket, unscrew the two bolts securing the oil pump to the cylinder block (illustrated on a removed engine for clarity)...



...and disengage the pump sprocket from the drive chain.

Remove the oil pump.

Before installing the pump, clean the mating surfaces of the pump and the cylinder block of oil. Install the oil pump in the reverse order.

Tighten the pump mounting bolts to the specified torque (see " Appendices," p. 315).

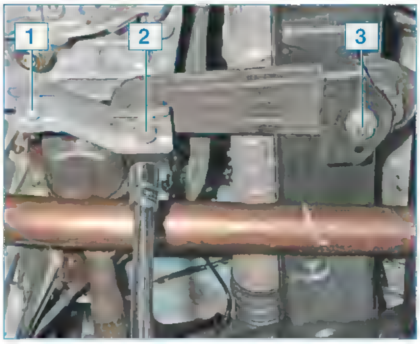
Replacing the engine mount

Replace the mount if the rubber is torn or has separated from the metal parts of the mount, which can cause knocking when starting the engine or when driving over bumps.

Work is carried out in an inspection pit or on a service ramp.

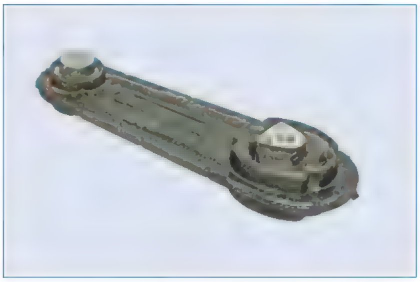
Replacing the rear mount

Remove the power unit protection (see "Removing the power unit protection," p. 283).



Using an 18 mm socket, loosen the tightening of bolt 1 that secures the bracket support to the transmission housing, unscrew bolt 2 securing the support to the transmission housing, and bolt 3 securing the support to the subframe.

Remove the support.



Rear engine mount

Install the rear engine mount in the reverse order.

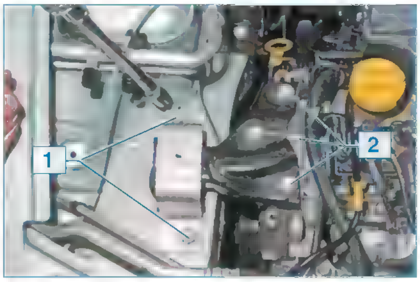
Replacing the right support

Remove the power unit protection (see "Removing the power unit protection," p. 283).

Place a jack under the oil pan.

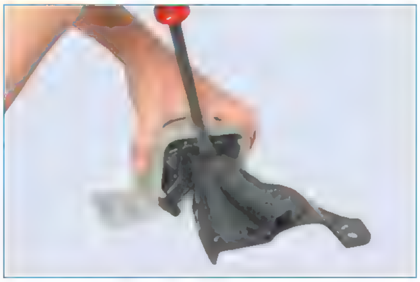
jack.

To avoid damaging the oil pan, you should place a thick rubber pad or a wooden block underneath it.



Using a 16 mm socket, loosen two bolts 1 of the bracket mounting the support ear to the body and three bolts 2 of the bracket mounting the support to the upper timing belt cover.

Remove the right support assembly. If necessary...



...use a trim tool to pry out...

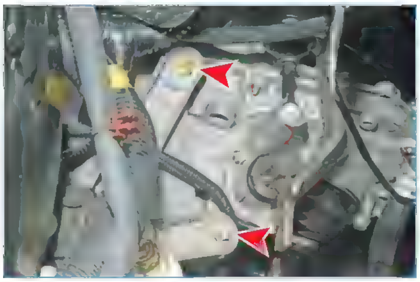
...and pull the bracket out of the support cushion.

Install the right mount in reverse order.

Replacing the left mount

Remove the battery (see “Removing the battery,” p. 248). Remove the power unit protection (see “ Removing the power unit protection,” p. 283).

Place a jack under the gearbox as described above when removing the right mount.



Use a 16 mm socket to loosen the two bolts securing the support bracket to the gearbox.

The third bolt securing the support bracket to the gearbox is located under the battery tray.

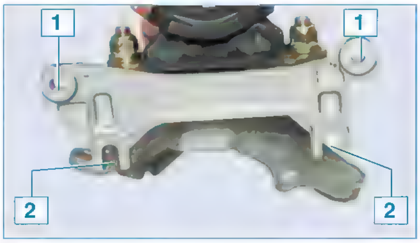
Unscrew it with a 16 mm socket using a universal joint through the hole in the battery tray shelf.

Under the battery tray shelf, use a 13 mm socket with a long extension to unscrew the front bolt of the upper bracket mounting.

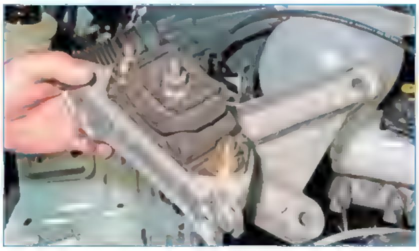
to the supports on the longitudinal member.

Use a 13 mm socket to loosen the rear bolt of the upper support bracket mounting to the longitudinal member, located behind the battery tray.

Under the battery shelf, using a 13 mm socket with an extended handle, turn two bolts of the lower bracket mount to the longeron 2–3 turns.

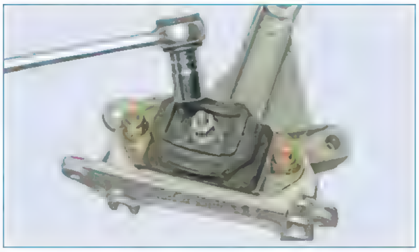


Locations of the mounting holes for the support bracket on the longeron (shown on the removed support): 1 – upper mounting holes; **2 –** lower mounting holes



Remove the left powertrain support assembly.

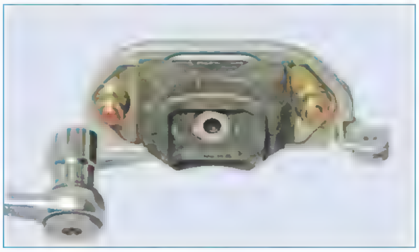
If necessary...



...using a 16 mm socket, loosen the nut securing the mount to the bracket...

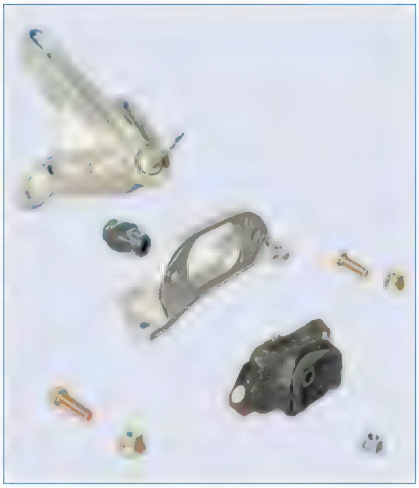
...and remove the support from the bracket.

Pull out the rubber insert from the mount.



Using an 18 mm socket, loosen the two nuts...

...removing the support cushion.



Details of the left engine mount

Install the left engine mount in reverse order.

Removal and installation of the engine or power unit

Perform this work when engine repair or replacement is required.

If the work is carried out in an inspection pit or on a ramp, it is better to lift the engine out of the engine bay upward using a hoisting device, having first removed the gearbox.

In a garage equipped with a lift, it is more convenient to lower the entire power unit out of the engine bay and then separate the engine and gearbox.

The procedures for removing the engine and powertrain are shown for a vehicle equipped with power steering and air conditioning.

Remove the battery (see “ Removing the battery,” p. 248). Drain the engine oil (see “Engine oil and oil filter change 1.4–1.6 (8V),” p. 30) and the coolant (see “ Cooling system fluid change for the 1.4–1.6 (8V) engine,” p. 38). Disconnect the exhaust downpipe from the exhaust manifold (see “Removing the exhaust system,” p. 132). Disconnect the fuel line fitting from the fuel rail connector (see “ Removing the fuel rail and injectors,” p. 117). Disconnect the cable end from the throttle lever intermediate arm (see “Replacing the throttle cable,” p. 121). Disconnect the vacuum brake booster check valve hose from the engine intake pipe fitting (see “ Removing the vacuum brake booster check valve,” p. 231).

Disconnect the purge tube of the charcoal canister from the fitting on the intake pipe (see "Removing the intake pipe, replacing gaskets," p. 119). Remove the power steering fluid reservoir from the upper crossmember of the radiator support. Disconnect the power steering hose bracket from the engine block (see "Replacing the oil pan gasket," p. 94). Unscrew the bolts securing the power steering pump to the engine bracket (see " Removing the power steering pump," p. 219) and, without disconnecting the pump hose and line, tie the pump to the upper crossmember of the radiator support with cord or wire so that it does not interfere with engine removal.

Remove the alternator (see “Removing the alternator, replacing the voltage regulator and rectifier assembly on 1.4–1.6 (8V) engines,” p. 248). Disconnect the wires from the starter (see “Removing and testing the starter,” p. 251).

Loosen the bolts securing the air-conditioning compressor to the bracket (see "Removing the air-conditioning compressor", p. 313) and, without disconnecting the air-conditioning system pipes, move the compressor aside and tie it up so it does not interfere with engine removal.

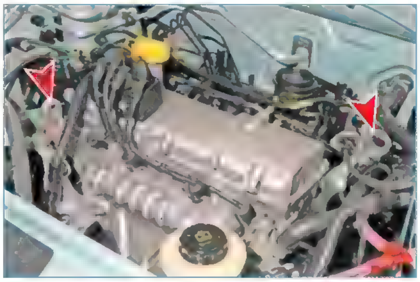
Remove the cooling system radiator (see "Removing the radiator", p. 128). Disconnect the cooling system hoses from the thermostat housing, the cylinder head outlet pipe, and the coolant pump pipe.

Disconnect the connector plugs of the engine management wiring harness from the ignition coil, the idle speed control valve, the fuel injectors, the purge valve solenoid for the charcoal canister, and the sensors: oxygen concentration, knock, absolute intake air pressure, intake air temperature, low oil pressure warning, coolant temperature, crankshaft position, and throttle position (see the respective sections).

Pull the wire harnesses away from the engine to the side.

If the engine is to be removed upward from the engine compartment using a hoist, you must first remove the transmission (see “Removing the transmission,” p. 189).

Raise the hood and hold it in the vertical position. Secure the hoist chains...

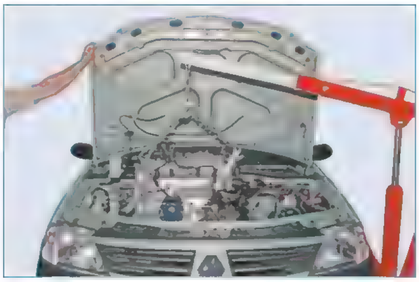


...to the engine brackets (indicated by arrows).

With the chains taut, remove the prop from under the engine that supported it when the transmission was removed.

On the right engine mount, remove the holder for the adsorber purge tube and move the tube aside, remove the brace, and unscrew the two bolts fastening the right mount to the body (see “Replacing the engine mounts,” p. 96).

Before removing the engine, check once more that all hoses, pipes, and wires are disconnected from the engine and moved aside.



Using a lifting device, raise and remove the engine from the engine compartment.
If the work is carried out on a hoist and the power unit is removed downward, it is not necessary to remove the alternator — you only need to disconnect its wires. You may also leave the power steering pump and the air-conditioning compressor on the engine and simply disconnect their pipes and hoses (see also “Removing the power steering pump”, p. 219 and “Removing the air-conditioning compressor”, p. 313).

When removing the power unit, instead of performing the gearbox removal operations, carry out the following tasks.

Remove the front wheel drive shafts (see “Removing the front drive shafts,” p. 194) and the subframe (see “Removing the subframe,” p. 204).

Disconnect the clutch release cable from the release fork and the bracket on the gearbox (see “Replacing the clutch release cable,” p. 183).

Disconnect the gearshift control rod from the selector mechanism rod (see “Removing the gearshift control rod,” p. 188).

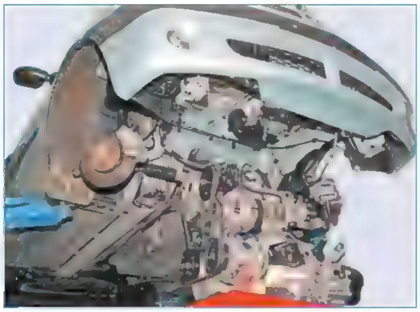
Disconnect the "ground" wires and the wiring harness from the gear box (see "Removing the gearbox", p. 188).

Remove the vehicle speed sensor (see “Removing the speed sensor,” p. 110). Disconnect the wiring plug from the reverse light switch (see “Removing the reverse light switch,” p. 261).

Place adjustable supports or a sturdy table under the engine and gearbox. Remove the right engine mount (see “Replacing engine mounts,” p. 96).

Unscrew the nut securing the left engine mount to the mount bracket (see "Removing the gearbox", p. 189).

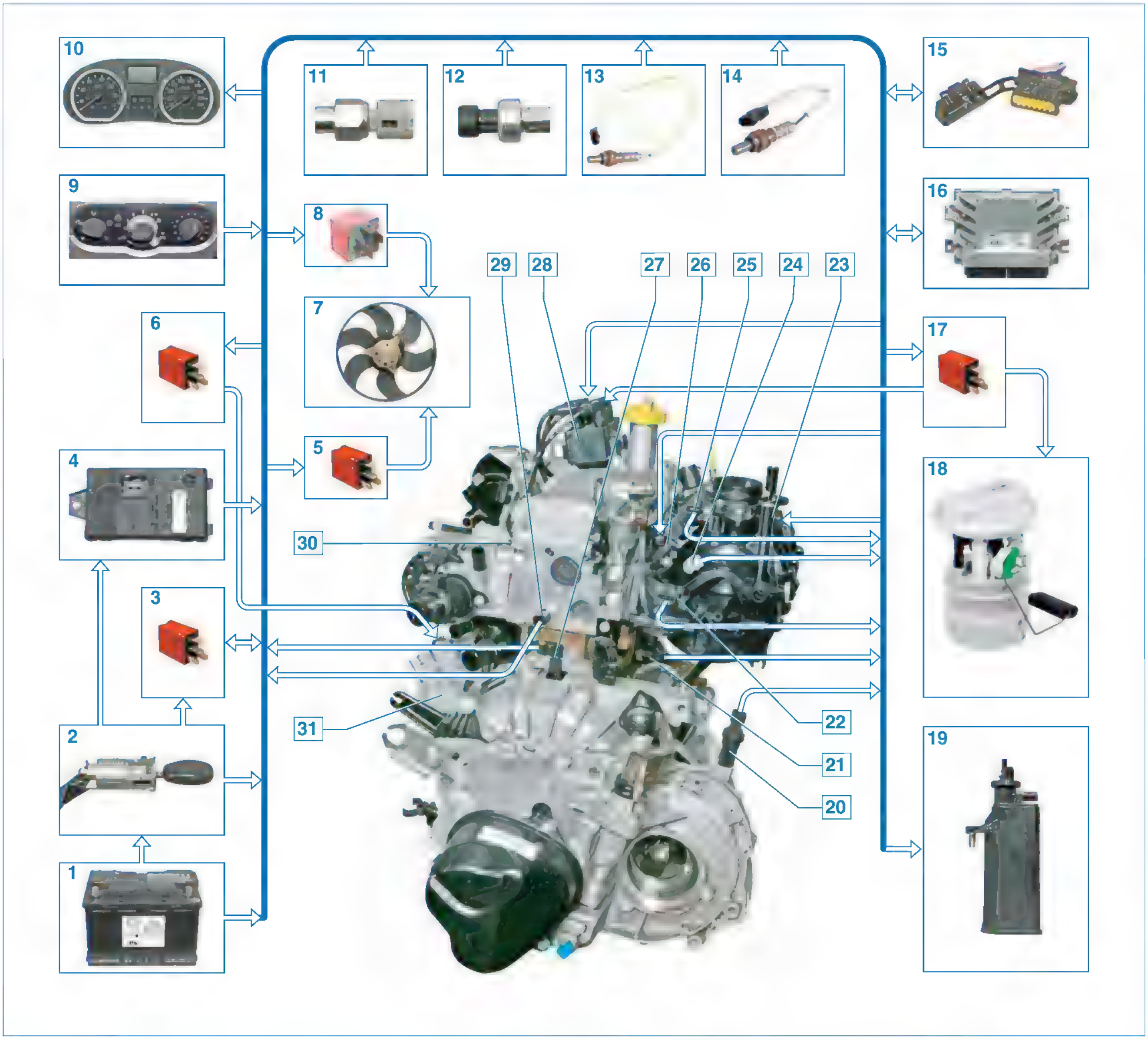
While raising the car on a lift or lowering the power unit onto adjustable supports, withdraw the stud of the left mount bracket from the hole in the mount cushion.



Remove the power unit.
Install the engine or power unit on the vehicle in the reverse order.

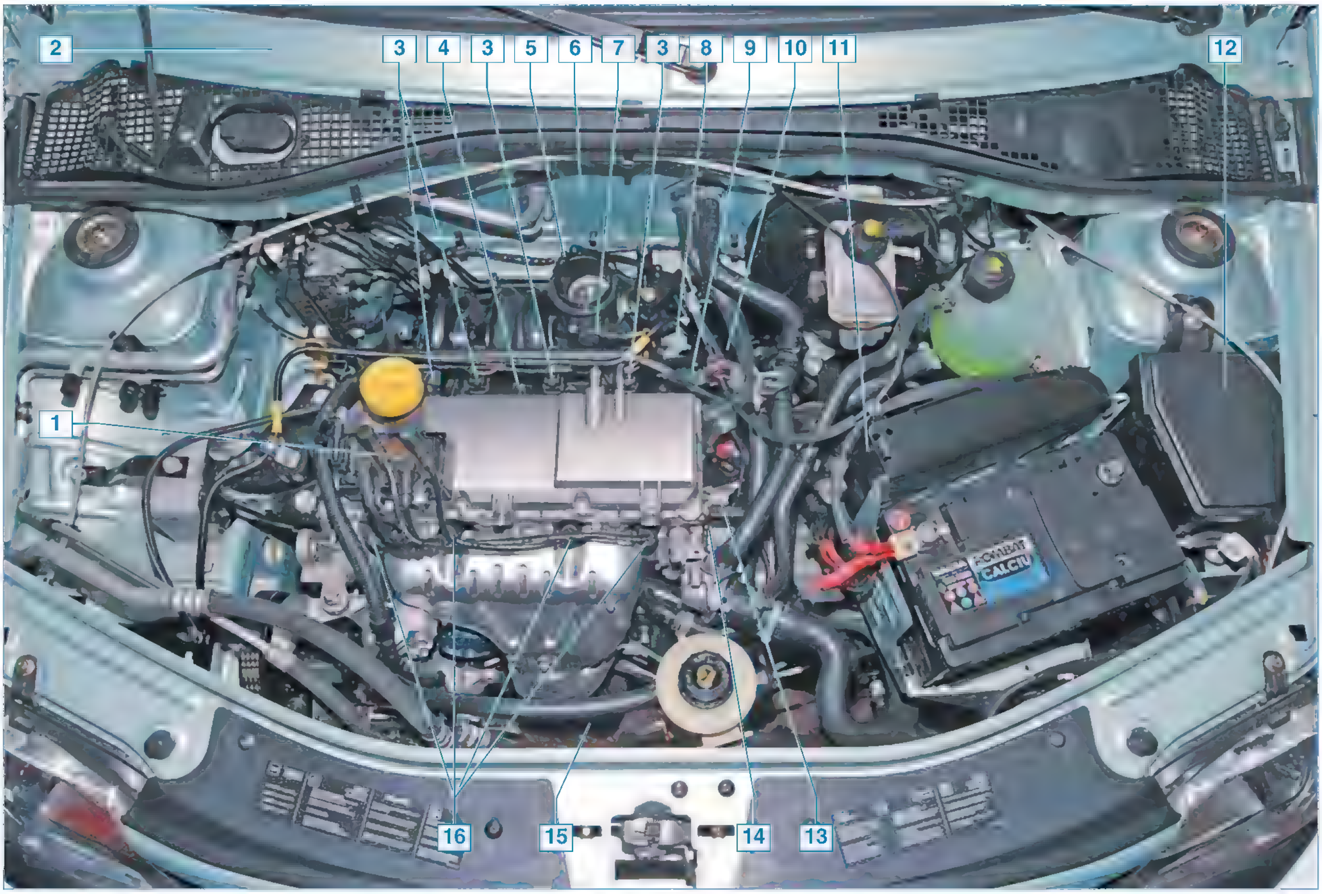
Engine management system 1.4–1.6 (8V)

Design description



Electronic engine management system diagram: **1** – battery; **2** – ignition switch; **3** – main relay; **4** – junction block; **5** – low-speed cooling fan relay; **6** – air conditioning clutch relay; **7** – fan; **8** – high-speed cooling fan relay; **9** – ventilation, heating, and air-conditioning control unit; **10** – instrument cluster; **11** – refrigerant pressure sensor; **12** – power steering pressure sensor; **13** – oxygen sensor (control); **14** – diagnostic oxygen sensor **15** – diagnostic connector (diagnostic plug); **16** – engine control unit (ECU); **17** – fuel pump and ignition coil power relay; **18** – fuel module; **19** – charcoal canister (evaporative emissions system); **20** – vehicle speed sensor; **21** – knock sensor; **22** – manifold absolute pressure sensor; **23** – idle speed control valve; **24** – intake air temperature sensor; **25** – throttle position sensor; **26** – fuel injector; **27** – crankshaft position sensor;**28** – ignition coil; **29** – c oolant temperature sensor; **30** – spark plug; **31** – air conditioning compressor

Engine management system 1.4–1.6 (8V)



Elements of the electronic engine management system (EEMS): 1 – ignition coil; **2*** – diagnostic connector;**3** – injectors; **4*** – knock sensor; **5** – idle speed regulator; **6*** – diagnostic oxygen sensor;**7** – throttle position sensor; **8** – intake air temperature sensor; **9** – manifold absolute pressure sensor; **10*** – vehicle speed sensor; **11** – engine control unit; **12** – fuse and relay box in the engine compartment; **13** – coolant temperature sensor; **14*** – crankshaft position sensor; **15** – primary oxygen sensor; **16*** – spark plugs

---

* The item is not visible in the photo.

The engine is equipped with a multi-point fuel injection system (a separate injector for each cylinder) with electronic control and a system for reducing the toxicity of exhaust gases.

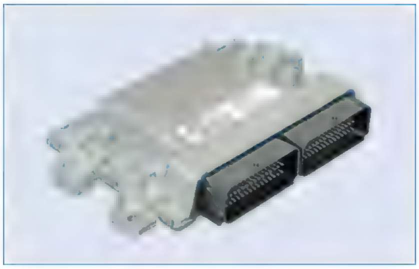
The engine management system consists of the engine control unit (ECU), sensors for engine and vehicle operating parameters, and actuators.

ECU is a special-purpose mini-computer; it includes a random-access memory unit (RAM) and a programmable read-only memory unit (PROM).

RAM is used for temporarily storing current engine operation information (measured parameters) and computed data. The engine control unit takes initial data for processing from the RAM. Error codes are also recorded in the RAM. This memory is volatile, i.e., its contents are erased when electrical power is cut off (battery disconnected or the wiring harness connector is unplugged from the ECU).

The ROM stores the engine control program, which contains a sequence of operating commands (algorithms) and calibration data (settings). The ROM determines the most important engine operating parameters: the pattern of torque and power variation, fuel consumption, ignition timing advance, composition of the exhaust gases, etc. ROM is non-volatile, i.e., its memory contents do not change when power is removed.

The ECU is mounted on the rear wall of the battery tray. The ECU processes information from the control system sensors, receives signals from the switch and the air conditioning refrigerant pressure sensor, and from the power steering pressure sensor.

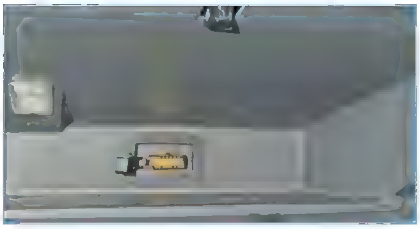


Engine control unit

the steering wheel, and also controls actuators such as the fuel pump, fuel injectors, ignition coil, idle speed regulator, purge solenoid valve of the charcoal canister, cooling system electric fan, engine overheat alarm, electromagnetic clutch of the air conditioner compressor, and various system relays. When the ignition is switched on, the ECU sends a control signal to the main relay, and when the ignition is switched off, it delays turning off the main relay for the time required to prepare for the next start (to finish calculations, set the idle speed regulator, and control the cooling system electric fan).

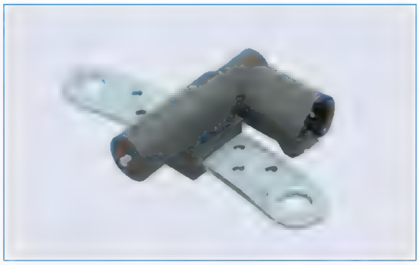
The ECU also performs diagnostic functions for the engine management system (on-board diagnostic system). The ECU detects the presence of faults in the control system components and stores fault codes in its memory. When a fault is detected, to prevent adverse consequences (piston burning due to detonation, damage to the catalytic converter in the event of misfires of the fuel-air mixture, exceeding allowable emissions toxicity levels, etc.), the ECU illuminates the malfunction indicator in the instrument cluster and switches the system to emergency operating modes. The essence of these modes is that when any sensor or its circuit fails, the ECU uses substitute data stored in ROM to control the engine.

The engine management system warning lamp is located in the instrument cluster. If the system is functioning properly, the lamp will light when the ignition is switched on and then go out — this allows the ECU to check the onboard diagnostic system. If the lamp lights while the engine is running, it indicates that the onboard diagnostic system has detected a fault and the vehicle will continue to operate in a limp-home (emergency) mode. Driving a vehicle with a constantly lit or flashing lamp in the instrument cluster is prohibited. The vehicle may be driven to a service station (although some engine performance parameters — power, responsiveness, fuel efficiency — may deteriorate) to correct the fault. If the fault is intermittent, the ECU will turn the lamp off after 10 s, provided there are no other fault codes stored in the ECU memory that require the lamp to remain on. Fault codes remain stored in the ECU memory and can be read using a diagnostic tool connected to the diagnostic connector.



Diagnostic connector (cover open)

Diagnostic connector is installed in the glove compartment of the instrument panel. The connector is covered with a plastic cap.

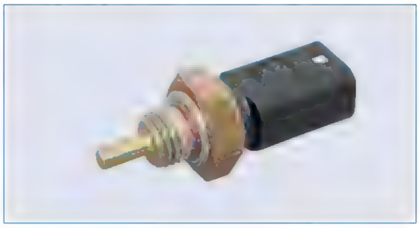


Crankshaft position sensor

Crankshaft position sensor (CPS) is mounted on the clutch housing, above the engine flywheel.

The sensor provides the ECU with information about the crankshaft's rotational speed and angular position. The sensor is of the inductive type; it responds to the passage of teeth machined on the flywheel near its core. The teeth are arranged on the disc at 6° intervals. To synchronize with TDC of pistons 1–4, one tooth out of 60 is cut away to form a notch, and one tooth is double. When the double tooth and the notch pass the sensor, it generates the so-called reference synchronization pulse. As the flywheel rotates, the magnetic flux in the sensor's magnetic circuit changes, inducing AC voltage pulses in its winding. From the number and frequency of these pulses, the ECU determines the phase and duration of the control pulses for the fuel injectors and the ignition coil.

If the CKP sensor or its circuits fail, the engine will not run.

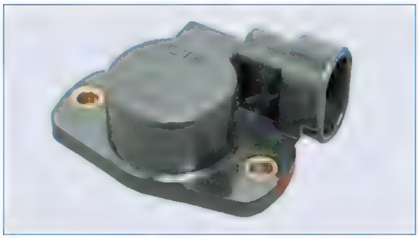


Coolant temperature sensor

Coolant temperature sensor (CTS) installed in the left end of the cylinder head cylinders. The sensor provides information about the coolant temperature to the ECU, the overheating warning light, and the coolant temperature gauge in the instrument cluster.

The sensor is a thermistor with a negative temperature coefficient, i.e., its resistance decreases as temperature rises. The ECU supplies the sensor with a stabilized voltage of +5 V and, from the voltage drop across the sensor, calculates the coolant temperature, values that are used by most engine control functions.

If a fault occurs in the sensor or its circuits, the ECU switches the cooling fan to continuous operation and estimates the temperature using a fallback algorithm.

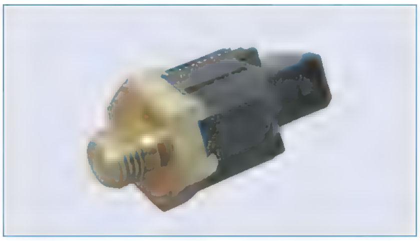


Throttle position sensor

Throttle position sensor (TPS) is mounted on the throttle shaft and is a potentiometric-type sensor.

A stabilized voltage of +5 V is applied to one end of its winding from the ECU, while the other end is connected to the ECU "ground." A signal for the ECU is taken from the third terminal of the potentiometer (slider). By periodically measuring the output voltage of the TPS signal, the ECU determines the current throttle position to calculate ignition timing advance and fuel injection pulse duration, as well as to control the idle speed regulator.

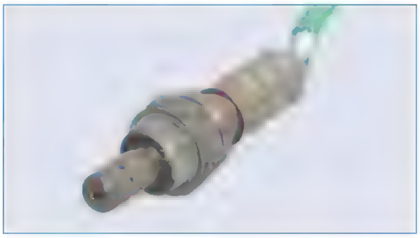
If the sensor or its circuits fail, the ECU estimates the throttle position based on crankshaft speed, absolute intake manifold pressure, and intake air temperature.



Knock sensor

Knock sensor (KS) is screwed into a threaded hole in the rear wall of the engine block, near the 3rd cylinder.

The piezoceramic sensing element of the sensor generates an AC voltage signal whose amplitude and frequency correspond to the engine vibration parameters. When knocking occurs, the amplitude of vibrations at a certain frequency increases. To suppress knock, the ECU adjusts the ignition timing advance.



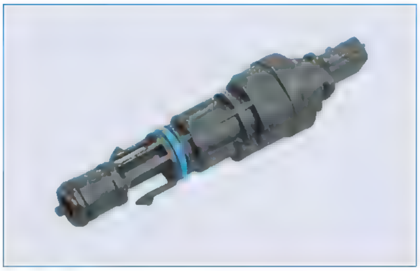
Oxygen sensor

The control oxygen concentration sensor (OCS) is installed in the intake pipe of the exhaust gas system upstream of the catalytic converter. The sensor is a galvanic current source whose output voltage depends on the concentration of oxygen in the sensor's surrounding environment. The ECU calculates the fuel injection pulse duration based on parameters such as air flow, crankshaft speed, coolant temperature, and throttle position. Based on the OCS signal indicating the presence of oxygen in the exhaust gases, the ECU adjusts fuel delivery by the injectors so that the exhaust composition is optimal for effective operation of the catalytic converter. Oxygen present in the exhaust gases, after reacting chemically with the sensor electrodes, creates a potential difference at the sensor output that varies roughly from 100±100 800 ±100

mV to mV. A low signal level corresponds to a lean mixture (oxygen present), while a high level indicates a rich mixture (oxygen absent). When the OCS is cold, the sensor output is absent because its internal resistance in this state is very high — several MΩ (the engine management system operates in open-loop). For normal operation the oxygen concentration sensor must reach at least 300 °C, so a heating element controlled by the ECU is built into it to speed warm-up after engine start. As the sensor warms, its resistance falls and it begins to generate an output signal. The ECU continually supplies a stabilized reference voltage to the sensor circuit. While the sensor is not warmed, the ECU controls the injection system without considering the sensor voltage. As soon as the sensor warms, the ECU switches off the sensor heater and begins to use the oxygen concentration signal to control fuel delivery in closed-loop mode.

closed circuit. The oxygen concentration sensor can be "poisoned" as a result of using leaded gasoline or sealants containing a large amount of silicone (silicon compounds) with high volatility during engine assembly. Silicone vapors can enter the combustion chamber through the crankcase ventilation system. The presence of lead or silicon compounds in the exhaust gases can cause the sensor to fail. If the sensor or its circuits fail, the ECU records the corresponding fault code in its memory and controls fuel supply in open-loop mode.

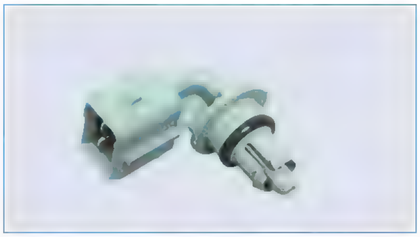
Diagnostic oxygen concentration sensor (DOCS) is installed in the exhaust pipe downstream of the catalytic converter. This sensor's function is to diagnose (assess the efficiency of) the catalytic converter and to perform a second, more precise control of fuel–air mixture enrichment (the slow PID control system). The signal generated by the sensor indicates the presence of oxygen in the exhaust gases after the catalytic converter. If the converter is functioning normally, the readings of the diagnostic sensor will differ from those of the control sensor (at a constant vehicle speed the voltage at the sensor terminals should vary within the range 600±100 mV, and during deceleration be below 200 mV). The operating principle of the diagnostic sensor is the same as that of the control oxygen concentration sensor, but the sensors are not interchangeable.


Vehicle speed sensor

The vehicle speed sensor (VSS) is mounted on the top of the gearbox mapping of the transmission. The sensor is driven by a gear mounted on the differential housing.
The operating principle of the speed sensor is based on the Hall effect. The sensor delivers rectangular voltage pulses to the ECU at a frequency proportional to the rotational speed of the drive wheels. The number of sensor pulses is proportional to the distance traveled by the vehicle. The ECU determines the vehicle speed from the pulse frequency. If the sensor or its circuits fail, the ECU records a fault code in its memory.

Absolute air pressure sensor

Air absolute pressure sensor (MAP) is installed in the intake manifold on the left side (in the direction of vehicle travel). The sensor contains a sensitive piezo element and a load variable resistor. The ECU supplies a stabilized voltage of +5 V to the sensor resistor. The sensor's piezo element responds to pressure (vacuum) changes in the intake manifold and varies the reference voltage applied to the load resistor. This change in voltage is taken into account by the ECU when calculating the amount of air entering the engine. If the sensor or its circuits fail, the ECU records a fault code in its memory.

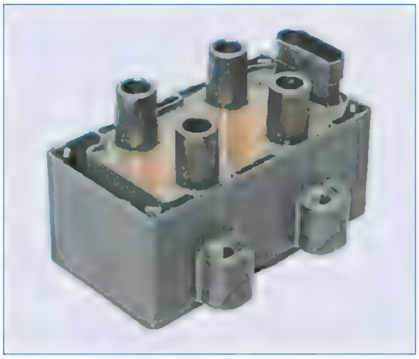

Intake air temperature sensor

Intake air temperature sensor (IAT) is installed in the intake duct on the left side (in the direction of vehicle travel).
The sensor is a thermistor with a negative temperature coefficient, meaning its resistance decreases as temperature increases. The sensor changes its resistance depending on the temperature of the air in the intake duct. The ECU uses the information from the sensor when calculating the fuel-air mixture and to adjust ignition timing. If the sensor or its circuits fail, the ECU records a fault code in its memory.

The ignition system is part of the engine management system and consists of the ignition coil, high-voltage wires, and spark plugs. During operation the system does not require maintenance or adjustment, except for replacement of the spark plugs.

The four-terminal ignition coil is a unit made up of two coils.

The current in the coils' primary windings is controlled by the ECU depending on the engine's operating mode. The secondary (high-voltage) winding terminals of the coils are connected to the spark plug wires: one winding to cylinder 1's



Ignition coil

and the 4th cylinder, and to the other – the 2nd and 3rd. Thus, a spark simultaneously jumps in two cylinders (1–4 or 2–3) – in one at the end of the compression stroke (working spark), and in the other at the end of the exhaust stroke (idle). The ignition coil is non-serviceable and is replaced if it fails.

Spark plug

Spark plugs have an interference-suppressing resistor with a resistance of 4–10 kΩ. The gap between the plug electrodes is 0.9–1.0 mm; the hex size for the wrench is 16 mm. Because the current direction in the coil's secondary windings is constant, the spark current in each pair of plugs that fire simultaneously always flows from the center electrode to the side electrode in one plug, and from the side electrode to the center electrode in the other.

Relays and fuses of the fuel injection system are located in the fuse box mounted in the engine compartment (see “Electrical equipment”, p. 240).

Control system operation

When the ignition is switched on, the ECU activates the control system: it turns on the fuel pump to build the necessary pressure in the fuel rail and processes signals from the coolant temperature sensor and the throttle position sensor to calculate the fuel–air mixture for engine start. If the crankshaft has not begun to be turned by the starter within that time, the ECU switches the fuel pump off after 2 s and turns it on again once cranking begins.

While the engine is running, the ECU processes information from sensors (crankshaft position, throttle position, coolant temperature, absolute intake air pressure, intake air temperature, vehicle speed, oxygen concentration in the exhaust gases, refrigerant pressure, power steering pressure). Depending on the engine operating mode, the ECU controls the injectors, ignition coil, idle speed regulator, purge valve of the charcoal canister, and cooling fan. When the air conditioner is turned on, the ECU increases the engine's idle speed and sends a signal to engage the air-conditioning compressor clutch.

The ECU calculates ignition timing advance based on the engine crankshaft speed, engine load, and coolant temperature.

The mixture is regulated by the duration of the control pulse supplied to the injectors—the longer the pulse, the greater the fuel delivery, and vice versa.

Under normal engine operating conditions, fuel injection is performed sequentially, into each cylinder at the start of the intake stroke. For this, the ECU uses information from the crankshaft position sensor, which determines TDC for pistons of cylinders 1 and 4, and also 2 and 3. The system lacks a camshaft position sensor (phase sensor). Therefore, to determine which of the two cylinders should receive the fuel injection, the ECU uses the following algorithm. At each engine shutdown, the ECU memory records the last activated injector, and on the next engine start the command is first sent to that injector. If fuel is injected into a cylinder not at the start of the intake stroke, the ECU runs a diagnostic routine and determines the correct injection sequence for the cylinders.

If there is no signal from the crankshaft position sensor (the shaft is not turning or the sensor and its circuits are faulty), the ECU cuts off fuel delivery to the cylinders. Fuel delivery is also cut off when the ignition is switched off, which prevents the self-ignition of the mixture in the engine cylinders.

During engine braking (with a gear engaged and the clutch released), when the throttle valve is fully closed and the engine crankshaft speed is high, fuel injection is not performed to reduce the toxicity of the exhaust gases.

When the onboard network voltage drops, the ECU increases the energy build-up time in the ignition coil (to ensure reliable ignition of the fuel mixture) and the duration of the injection pulse (to compensate for the increased injector opening time). When the onboard network voltage rises, the ignition coil energy build-up time and the duration of the pulse supplied to the injectors decrease.

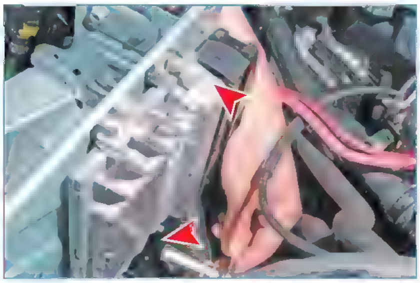
The ECU controls the activation of the cooling system electric fan (via a relay) depending on engine temperature, crankshaft rotational speed, and air conditioner operation (if installed). The cooling system electric fan turns on if the coolant temperature exceeds the allowable value.

When servicing and repairing the engine control system, always switch off the ignition (in some cases it is necessary to disconnect the cable terminal from the battery negative post). When performing welding work on the vehicle, disconnect the engine control system wiring harness from the ECU. Before drying the vehicle in a drying chamber (after painting), remove the ECU. Do not disconnect or adjust the engine control system harness connectors or the battery cable terminals while the engine is running. Do not start the engine if the battery cable terminals and the engine ground wire terminals are not secured or are dirty. The ECU contains electronic components that can be damaged by static electricity, so do not touch its terminals with your hands.

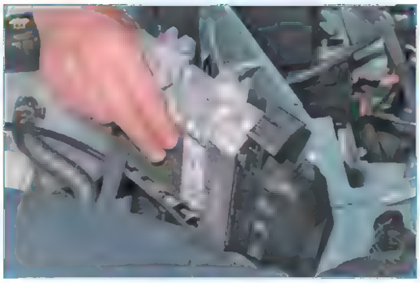
Removing the electronic control unit

Remove the unit for replacement or when performing repair operations on the vehicle that could damage the unit's electronic components (for example, when drying the vehicle in a drying oven after painting, etc.).

Disconnect the cable terminal from the battery's negative terminal.

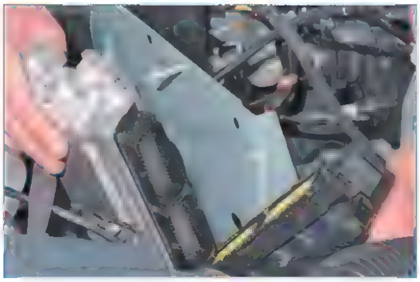


Use a 10 mm deep socket to loosen the two nuts securing the ECU.



Remove the ECU from the bracket studs.

Push the locking tab of the engine management wiring harness connector upward.



Disconnect the wiring harness connector from the ECU plug and pull it out.

ECU from the engine compartment. The connector of the wiring harness plug should be protected from ingress of foreign objects and dirt with a polyethylene bag.

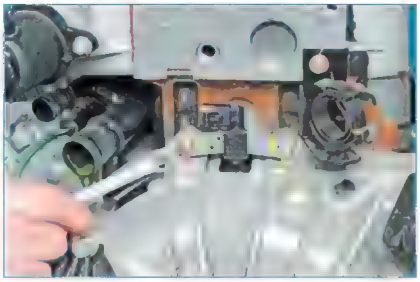
Install the engine control unit in the reverse order.

Removing the crankshaft position sensor

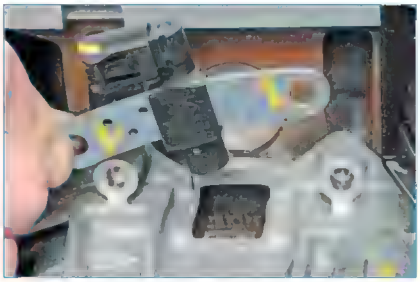
Remove the sensor for inspection or replacement.

Remove the intake hose from the air filter housing (see "Removing the air filter," p. 116).

With the ignition off, press back the locking tab on the engine management wiring harness connector and disconnect the wiring harness connector from the crankshaft position sensor.



Using an open-end wrench or a 10 mm socket, unscrew the two bolts securing the sensor (shown on the removed power unit for clarity).



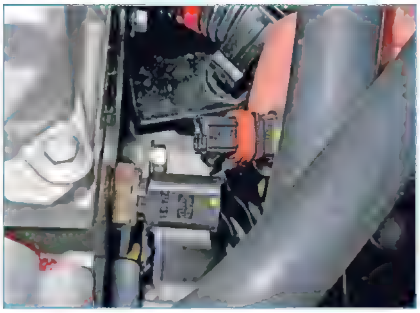
Remove the crankshaft position sensor.

Install the crankshaft position sensor in reverse order.

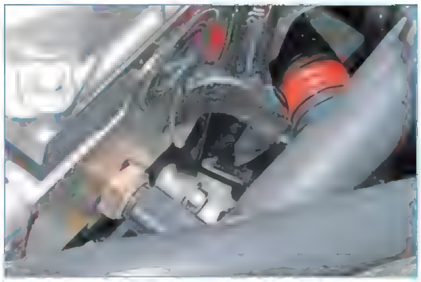
Removing the coolant temperature sensor

Remove the coolant temperature sensor for replacement. Perform the work on a cold engine.

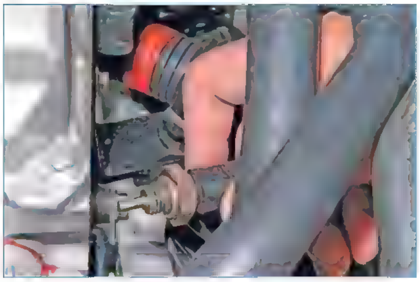
With the ignition off, press the connector latch of the engine management wiring harness...



...and disconnect the wiring harness connector from the coolant temperature sensor.

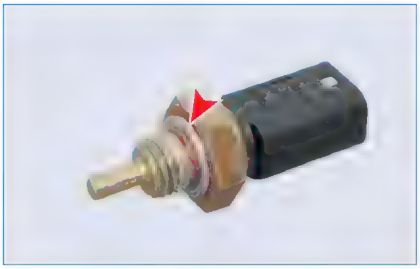


Loosen the sensor with a 21 mm wrench...



...unscrew the sensor from the hole-in the cylinder head...

...and close the hole in the cylinder head with your finger to



The sensor connection to the cylinder head is sealed with an aluminum washer

prevent coolant from leaking.

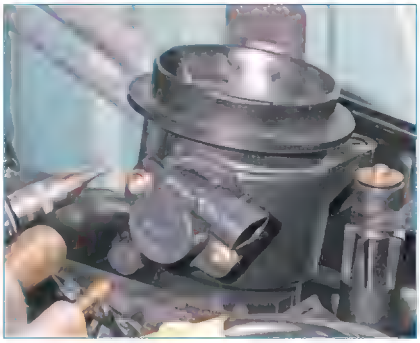
Install the coolant temperature sensor in reverse order. Check and, if necessary, bring the coolant level in the expansion tank to the correct level.

Removing the throttle position sensor

Remove the throttle position sensor for replacement.
Remove the air filter (see "Removing the air filter," p. 116).

With the ignition off, release the latch on the engine management wiring harness connector and unplug the wiring harness connector from the throttle position sensor—

throttle plate.



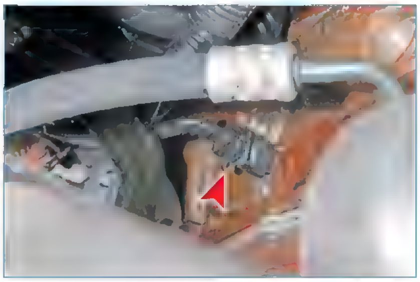
Use a Torx T-20 wrench to loosen the two self-tapping screws securing the sensor.

Remove the sensor from the throttle shaft—of the assembly.

Install the sensor in the reverse order. Before installing the sensor, make sure the throttle plate is fully closed.

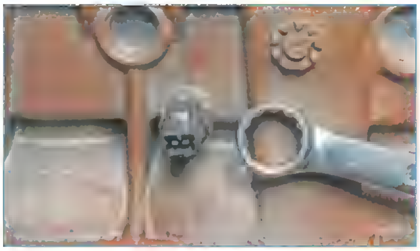
Removing the knock sensor

Remove the sensor for inspection and replacement.
The work is carried out on the inspection plo-on a lift or ramp.
Remove the powertrain shield (see "Removing the powertrain shield," p. 283).
With the ignition off...

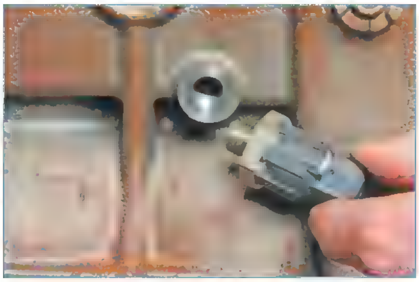


...press the wire retainer...

...and disconnect the wiring harness connector of the engine management system from the sensor.



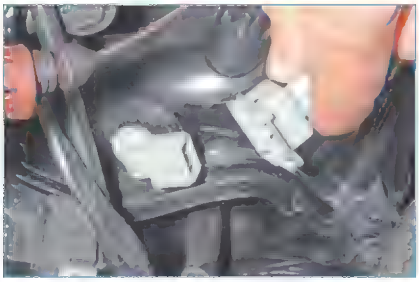
Using a 24-mm box wrench, loosen...



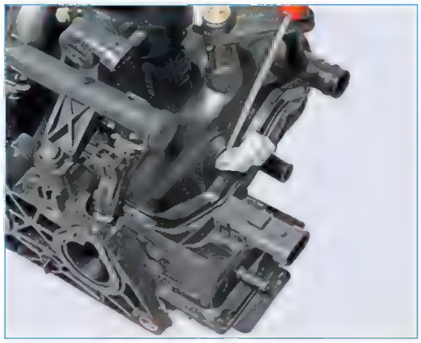
...and remove the knock sensor. Before installing the sensor, clean the surface of the cylinder block at the sensor mounting location. Install the knock sensor in the reverse order and tighten it to the specified torque.

Removal of the intake air temperature sensor

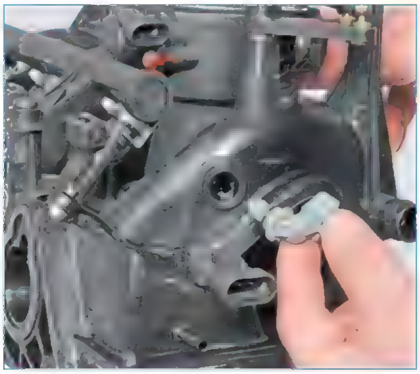
Remove the sensor to replace the failed sealing O-ring or the sensor itself. With the ignition off, press the wire retainer of the engine management wiring harness connector...



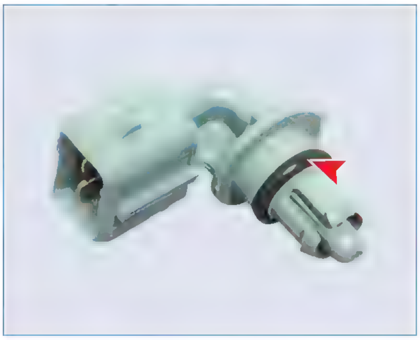
...and disconnect the wiring harness connector from the sensor.



Pry the sensor out with a slotted screwdriver, overcoming the resistance of its plastic retainers (shown on the removed intake manifold for clarity)...



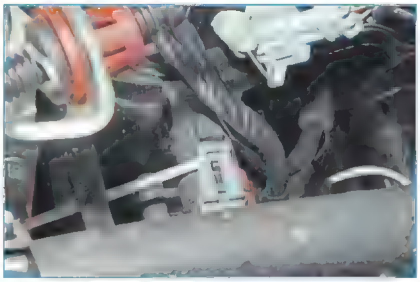
...pull the sensor out of the opening in the intake pipe. If the ring has damage such as cracks or tears, or if the rubber has lost its elasticity, replace the ring with a new one. When installing the sensor, insert its retainers into the corresponding slotted holes of the intake pipe.



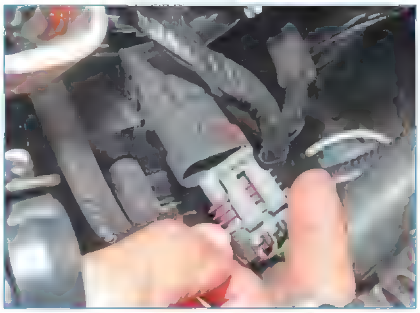
Connection of the sensor to the intake pipe—because the wire is sealed with a rubber O-ring

Removal of the absolute intake air pressure sensor

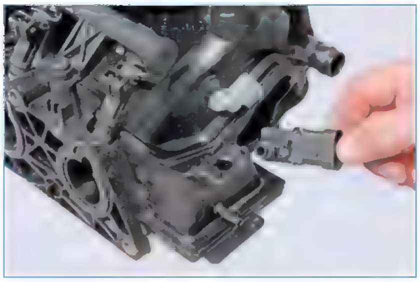
Remove the sensor to replace worn or damaged rubber sealing rings or the sensor itself. With the ignition switched off...



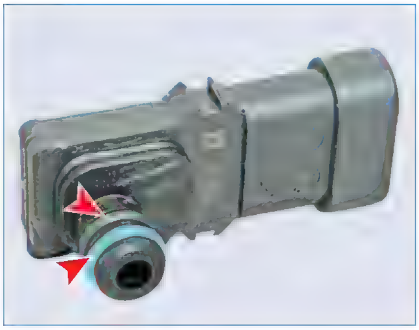
...use a screwdriver to press back the retainer for the engine control system wiring harness connector...



...and disconnect the wiring harness connector from the sensor. Prying the sensor with two slotted screwdrivers—we push it out of the intake pipe opening...



...and remove the sensor (for clarity shown on the removed intake pipe). If the rings have damage—such as cracks or tears, or if the rubber has lost its elasticity, replace the rings with new ones.



The sensor is sealed with two rubber O-rings

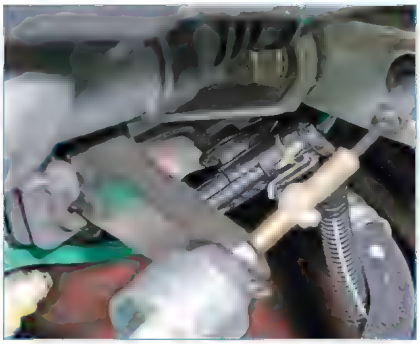
Install the intake manifold absolute air pressure sensor in reverse order.

Removal of oxygen concentration sensors

Remove the sensors for replacement and also when disassembling the exhaust gas system. Perform the work with the exhaust system components cooled.

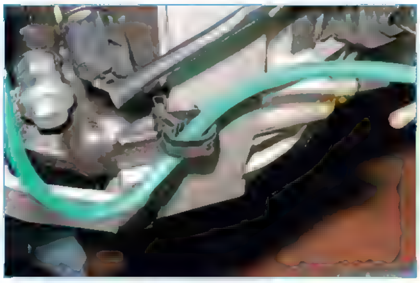
Removal of the control oxygen concentration sensor

In the engine compartment with the ignition switched off...

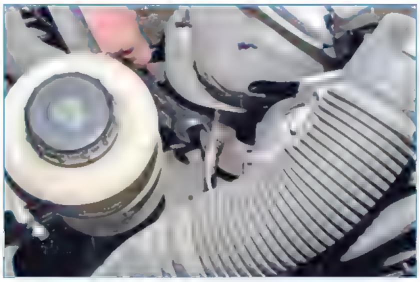


...we press the pad retainer of the engine control wiring harness...

...and disconnect the harness connector from the sensor harness connector.



Unclip the plastic holder and pull the sensor wiring harness out of it.



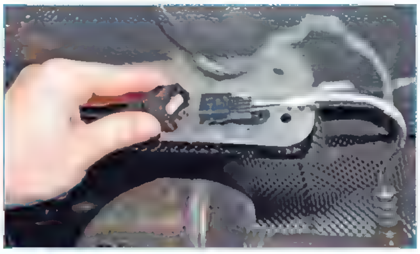
Use a 22 mm wrench to unscrew the sensor from the opening in the intake pipe...

...and remove the sensor.

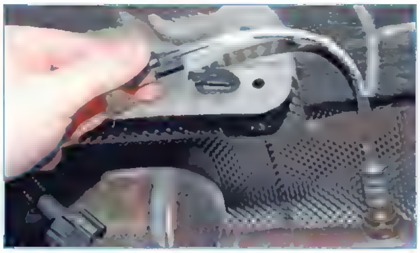
Install the control oxygen concentration sensor in reverse order. Before installation, apply a thin layer of graphite grease to the sensor's threads, taking care that none enters the sensor through the hole in its tip. Tighten the sensor to the specified torque (see “Appendices”, p. 315).

Removal of the diagnostic oxygen concentration sensor

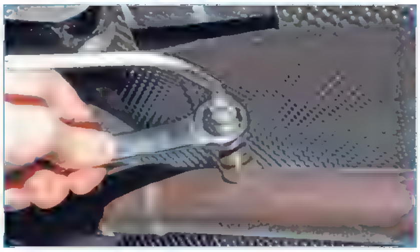
Work is performed on an inspection pit or a ramp. From beneath the vehicle, with the ignition off, press the locking tab of the wiring-harness connector of the engine management system...



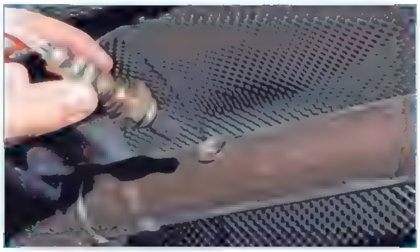
...disconnect the wiring-harness connector from the sensor's wire connector.



Remove the sensor wiring connector from the holder mounted on the heat shield.



Threading the wire block of the sensor through the loop of a 22 mm open-end wrench...

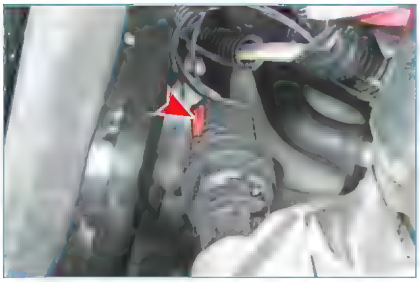


...unscrew the sensor from the threaded hole in the pipe.

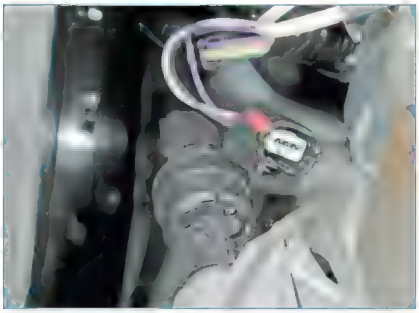
Install the diagnostic oxygen concentration sensor in reverse order. Before installation, apply a thin layer of graphite lubricant to the sensor's thread, taking care that it does not enter the sensor through the opening in its tip. Tighten the sensor to the specified torque (see “Appendices,” p. 315).

Removing the Speed Sensor

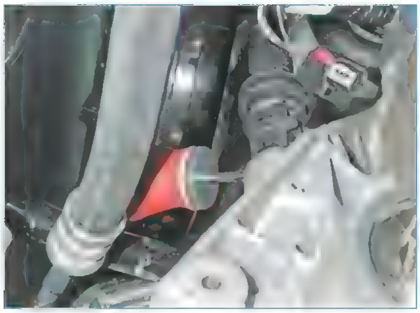
Remove the vehicle speed sensor for replacement and when dismantling the gearbox.
Remove the air filter (see " Removing the Air Filter," p. 116). For clarity of the procedure we show it from beneath the vehicle. With the ignition off...



...press the retainer (red) on the wiring harness connector of the engine management system...

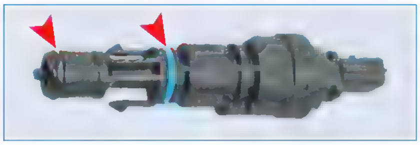


...and disconnect the wiring harness plug from the sensor.



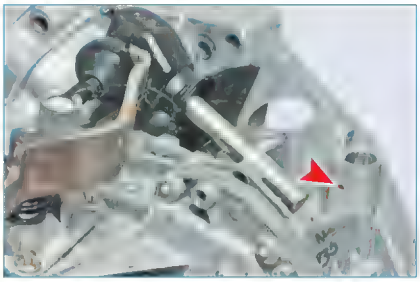
Use a flat-head screwdriver to pry the sen-chik...

...and, overcoming the resistance of its two clips, push the sensor out of the hole in the mating surface of the clutch housing.



In the clutch housing, the speed sensor is sealed by two rubber O-rings.

Install the speed sensor in reverse order. If the sensor's sealing rings have cracks or tears, replace the rings with new ones. When installing, the sensor should be oriented so...



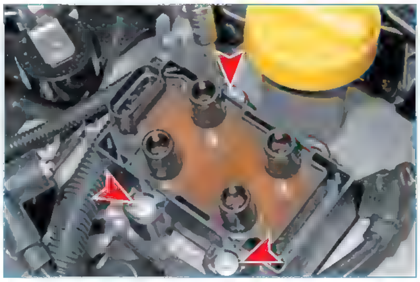
...so that its clips engage the side holes of the mating surface on the clutch housing (the second hole is on the opposite side of the mating surface).

Removing the ignition coil

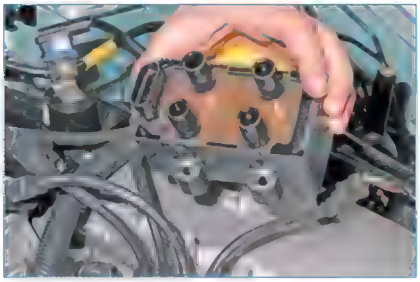
Remove the ignition coil for replacement and during engine repairs. With the ignition off, press the latch on the engine management wiring harness plug...

...and disconnect the wiring harness connector from the ignition coil.

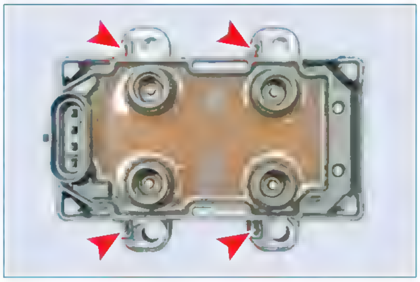
Remove the high-voltage wire boot from the ignition coil terminal.
Remove the terminals of the other high-voltage wires in the same way.



Use a Torx T-30 wrench to loosen the three screws securing the ignition coil to the cylinder head cover...



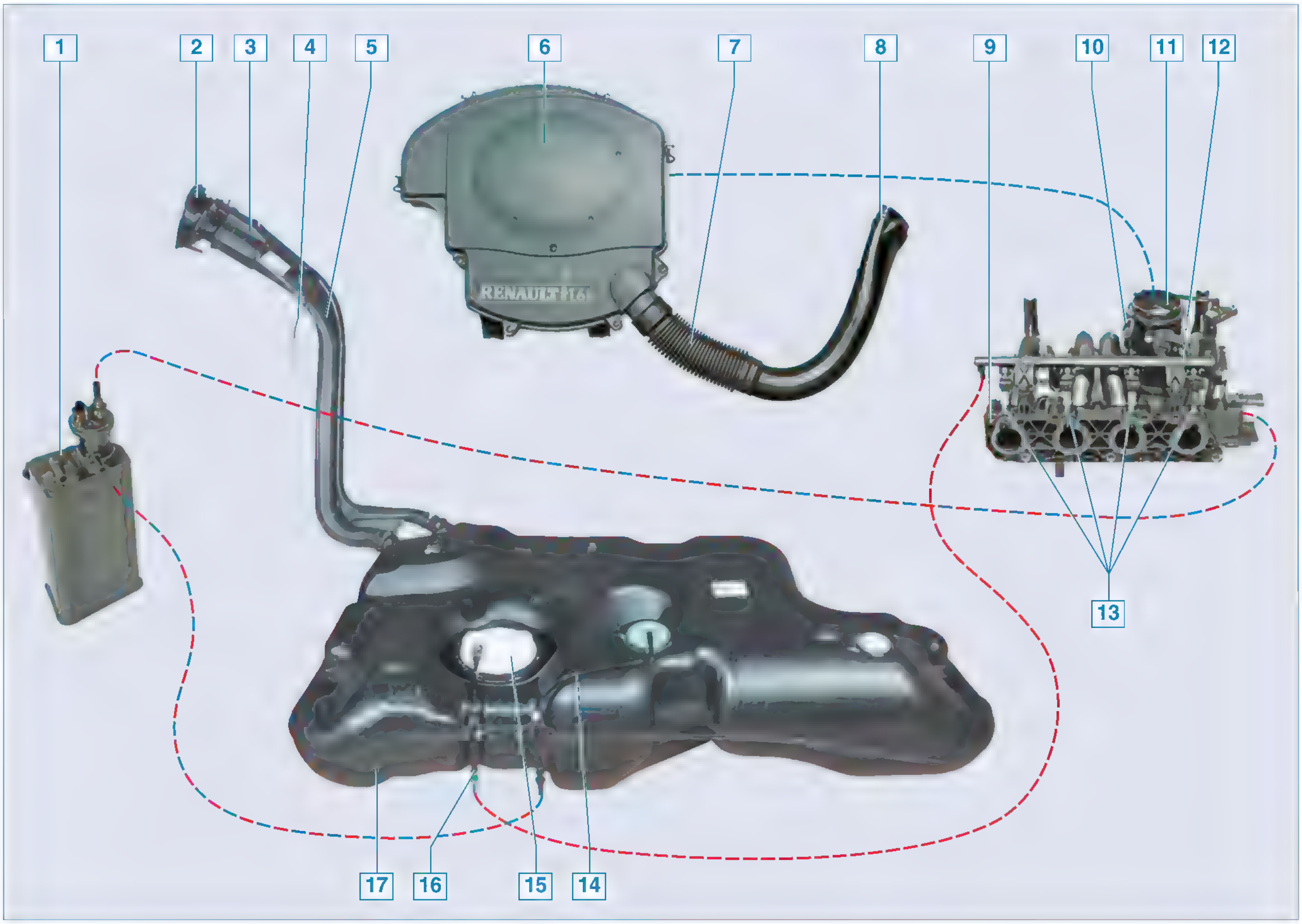
...and remove the ignition coil.
Install the ignition coil in the reverse order.



High-voltage wires are connected to the coil terminals according to the cylinder numbers marked on the coil housing.

Fuel system for 1.4–1.6 (8V) engines

Design description

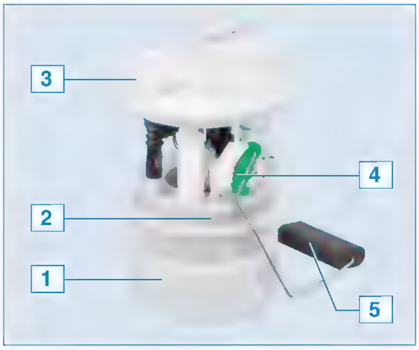


Fuel system components: 1 – canister; **2** – filler neck; **3** – fuel tank vent tube; **4** – ground wire; **5** – filler pipe; **6** – air filter; **7** – air intake hose; **8** – air intake; **9** – intake manifold;**10** – idle speed regulator; **11** – throttle assembly; **12** – fuel rail; **13** – injectors; **14** – vapor line to canister; **15** – fuel module; **16** – fuel feed line to rail; **17** – fuel tank

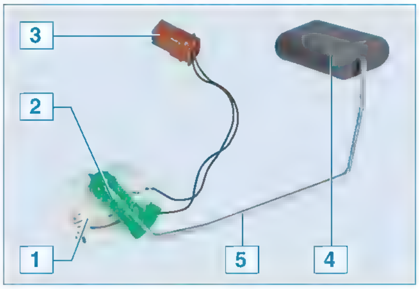
Fuel is supplied from the tank mounted under the floor in the rear seat area. The fuel tank, filler pipe and vent pipe are made of plastic. The connection of the filler pipe and vent pipe to the tank fittings is non-detachable. A filler neck is formed at the top of the filler pipe, which is attached to the body panel. The vent pipe serves to remove air displaced from the tank during refueling.**Fuel module**, which includes the fuel pump, fuel pressure regulator, fuel filter and fuel level sensor, is installed in the fuel tank. A mesh filter is installed at the module inlet for coarse fuel filtration.

There is an access flap in the vehicle floor under the rear seat cushion to reach the fuel module.

The fuel level gauge sensor is attached to the fuel module housing. The fuel level gauge sensor is a variable resistor whose resistance depends on the float position. The sensor controls



Fuel module: 1 – canister; **2** – fuel filter; **3** – module cover;**4** – fuel gauge sensor; **5** – float



Fuel level gauge sensor: 1 – resistor; **2** – slider; **3** – sensor wiring connector; **4** – float; **5** – float lever

Fuel pump

the operation of the fuel level gauge and the low fuel warning light located in the instrument cluster.

Fuel pump is located inside the housing of the fuel module. The pump is electric, submersible, and rotary. It is activated by the ECU when the ignition is switched on and supplies fuel to the line at a pressure (about 6.0 bar) that exceeds the working pressure in the rail.

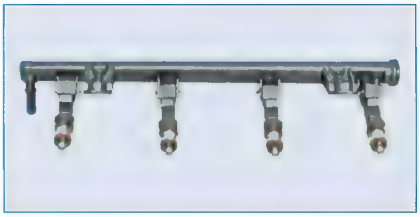
As fuel passes through the pump during operation, it lubricates and cools the pump. Therefore, it is forbidden to run the pump even for a short time if there is no fuel in the tank. The fuel pump capacity is at least 60 L/h.

From the pump, fuel is delivered under pressure to the fuel filter. The fuel filter is part of the fuel module and can only be replaced together with it. It is designed to remove mechanical impurities from the fuel with a filtration fineness down to 10 µm.

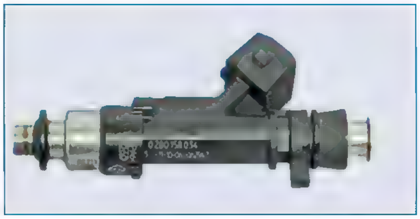
The fuel pressure regulator is non-serviceable, is part of the fuel module, and if it fails must be replaced together with the module. Fuel pressure in the fuel rail with the ignition on and the engine off should be about 3.2 bar.

The fuel rail is a plastic tube on which the injectors are mounted. The rail is attached to the intake pipe with two screws. On the right side of the rail there is a fitting to which the pressurized fuel line is connected.

Pressurized fuel is fed into the inner cavity of the rail, and from there — through **nozzles** into the intake manifold.



Fuel rail with injectors



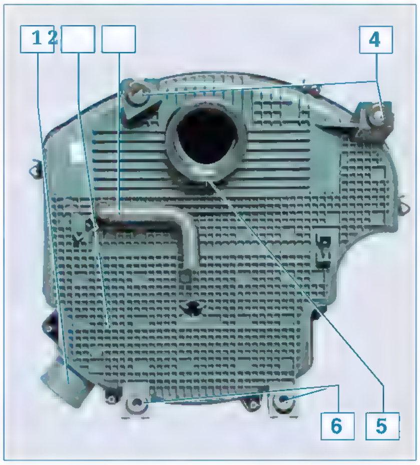
Fuel injector

A spray nozzle with four holes is formed at the outlet of the injector, through which fuel is injected into the channels of the intake manifold. The ECU controls the injectors. The injectors are sealed in the rail and intake manifold with rubber rings and are secured to the rail with metal clips. If an injector's coil is open or shorted, the injector should be replaced.

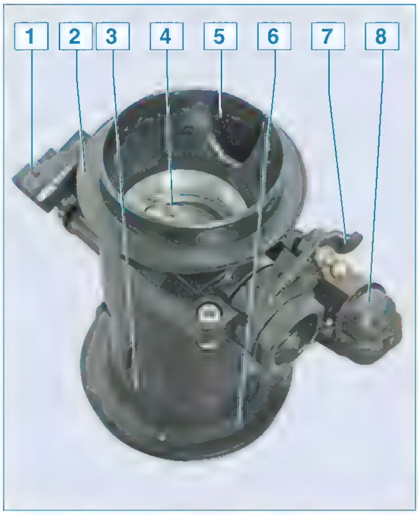
Air is supplied to the engine throttle assembly through the air intake, a corrugated plastic hose, and the air filter.

The air filter is mounted on top of the engine with four screws. The filter element is paper. A neck is formed on the bottom of the filter housing that fits over the throttle assembly outlet. Also on the bottom, a hose for the main crankcase ventilation circuit is connected to the filter housing fitting.

After the filter, the air passes through the throttle assembly into the engine intake piping.



View from below of the air filter: 1 — air inlet duct to the air filter; **2** — filter housing;**3** — fitting for the main crankcase ventilation hose; **4** — mounting points for the filter to the intake pipe;**5** — neck for connection to the throttle body duct; **6** — mounting points for the filter to the cylinder head cover



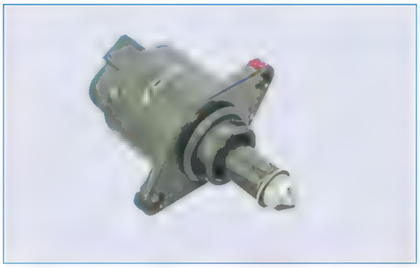
Throttle assembly: 1 — throttle position sensor; **2** — flange for connection to the air filter;**3** — body; **4** — throttle plate;**5** — air passage to the idle speed regulator; **6** — flange for connection to the intake pipe; **7** — throttle lever; **8** — idle speed regulator

The throttle assembly is made of high-strength, heat-resistant plastic and is the throttle body (with molded passages) on which the idle air control valve and the throttle position sensor are mounted. The throttle assembly is secured to the intake manifold.

When the accelerator pedal is pressed, the throttle valve opens, changing the amount of air entering the engine (fuel delivery is calculated by the ECU based on the air flow).

When the engine is idling (throttle valve closed), the ECU controls the air supply using the idle air control valve.

Idle speed regulator (ISR) is a stepper electric motor with a micrometric screw (valve). The valve's closing element (needle) changes the channel's cross-section and provides regulation of the airflow bypassing the throttle valve.



Idle speed regulator

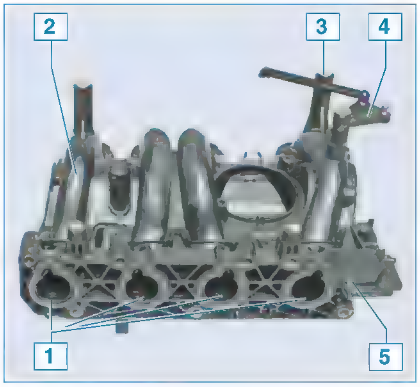
To increase the crankshaft speed at idle, the ECU sends a control signal to open the valve, increasing airflow through the throttle bypass; conversely, to reduce engine speed it commands the valve to close. During engine braking, the throttle valve closes abruptly, and the ISR increases airflow through the throttle bypass, causing the fuel mixture to lean out. This helps reduce hydrocarbon and carbon monoxide emissions. The idle speed regulator is non-serviceable and must be replaced if it fails.

After passing through the throttle assembly, the air enters the **intake manifold**, made of high-strength heat-resistant plastic.

From the common chamber of the intake manifold – the receiver – air is fed through four separate channels cast into the manifold to the intake ports of the cylinder head. To ensure uniform filling of the engine cylinders with air, the intake manifold channels are made approximately the same length.

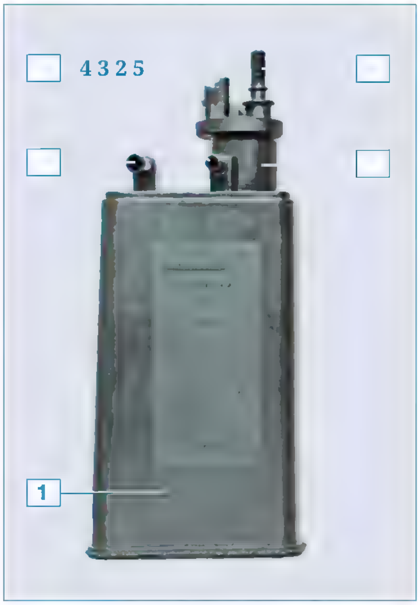
The evaporative emissions control system used in the fuel system includes an absorber, an absorber purge solenoid valve, and connecting tubes and hoses.

From the fuel tank, fuel vapors enter the **adsorber** (mounted under the front bumper, in front of the right wheel arch) through a fitting indicated by the arrow, where they are absorbed by the sorbent (activated carbon).



Intake manifold components: 1 — air supply channels to the cylinder;**2** — receiver; **3** — throttle linkage; **4** — intermediate throttle lever; **5** — sealing gasket

The second fitting of the adsorber is connected to the atmosphere. An electromagnetic purge valve for the adsorber is mounted on top of the adsorber. The valve fitting is connected to the intake pipe with a plastic tube.



Evaporative canister components: 1 — canister;**2** — air inlet fitting; **3** — fuel vapor inlet fitting from the tank;**4** — solenoid valve fitting;**5** — solenoid valve

When the engine is stopped, the purge solenoid valve is closed, and in this case the canister is not connected to the intake manifold. The ECU, by controlling the solenoid valve, performs canister purge after the engine has run for a specified period of time since switching to closed-loop fuel control (the oxygen sensors must be warmed up to the required temperature). The valve connects the canister chamber to the intake manifold and the sorbent is purged: gasoline vapors mix with air and are drawn into the intake manifold and then into the engine cylinders. The greater the engine's air flow, the longer the ECU's control pulses and the more intensive the purge.

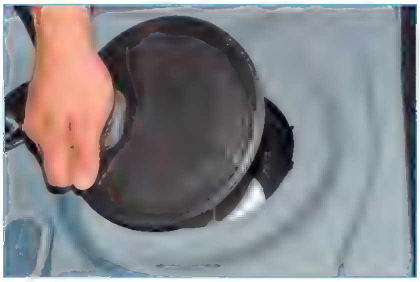
Check of the power supply system components is shown in the " Troubleshooting" section, p. 55.

Removal and disassembly of the fuel module

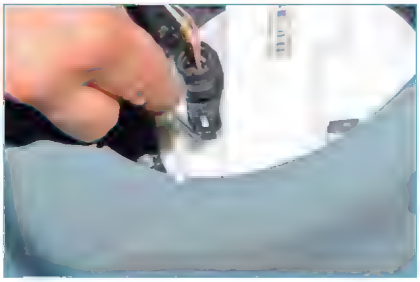
Remove the fuel module if any of its components fail. Replacement of the fuel pump, mesh filter, or fuel level sensor is shown to allow for repairs in the field and when original spare parts are not available.

In the car's interior, we raise the rear seat a bit.

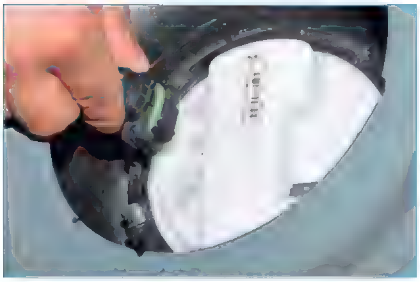
Pry up with a screwdriver...



...we lift the fuel flap cover of the tank

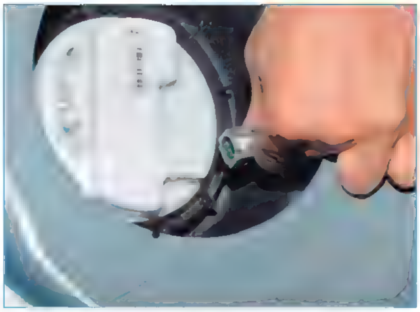


Depress the retainer...



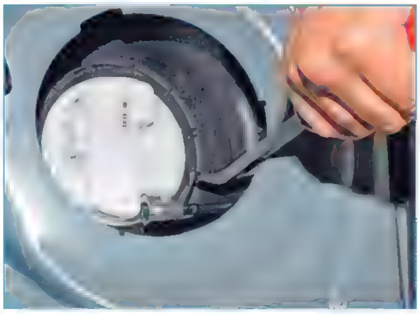
...and disconnect the wiring plug from the fuel module cover.

Next, relieve the pressure in the fuel system. To do this, start the engine. It will run for a few seconds and then stop due to lack of fuel. The pressure in the system will be relieved. Turn off the ignition.



Compressing the locks of the fuel line tube fitting, remove it from the fuel module cover nozzle.

The fuel module is secured in the tank by a retaining ring screwed onto the filler neck. To unscrew the module's retaining ring, it is easiest to use a pry bar.

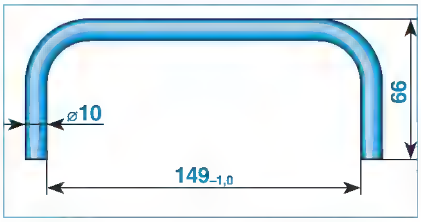


Bracing against the recesses of the hole punched in the floor panel, use a pry bar to push the ring by its tabs counterclockwise.

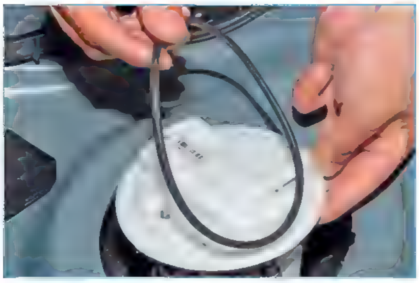
You may need to repeat the procedure several times, levering against different tabs around the ring. When reassembling, you must do this when tightening the ring.

Remove the retaining ring.

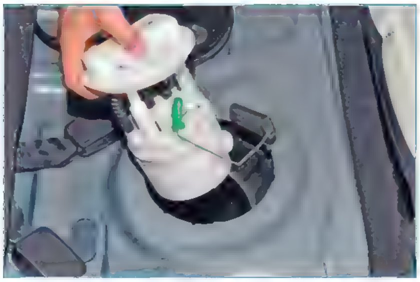
A simple tool bent from a metal rod into a clamp shape will help to turn the retaining ring on the removed tank.



Tool for turning the retaining ring

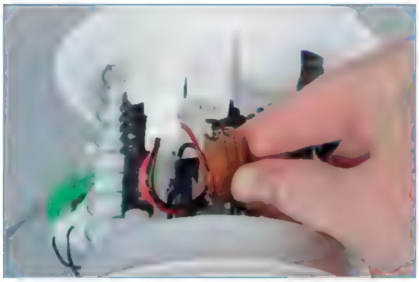


Remove the sealing ring of the fuel module by turning it through the module cover.

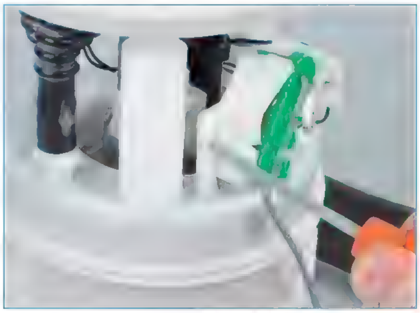


Remove the fuel module from the tank, pulling the fuel gauge float out through the opening in the fuel tank.
Drain the remaining fuel from the fuel module into a prepared container. Close the opening in the fuel tank with heavy paper or polyethylene.

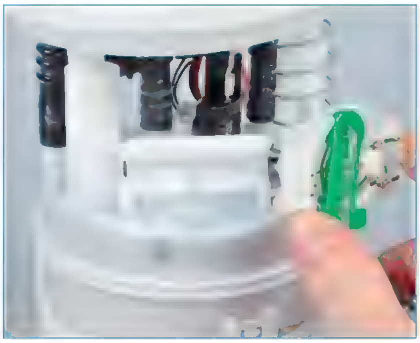
Further disassembly of the fuel module is not intended. The vehicle designers recommend replacing the entire module if any of its components fail. However, in exceptional circumstances it is possible to clean the mesh filter at the inlet to the fuel pump, or to replace the fuel level sensor or the fuel pump.



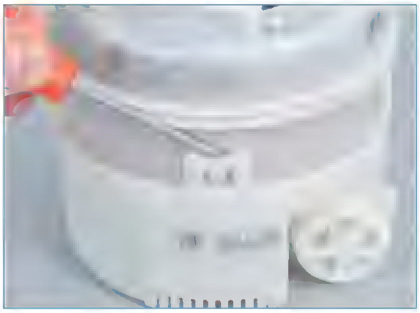
Disconnect the wiring connector of the fuel level sensor from the connector on the inner side of the fuel module cover.



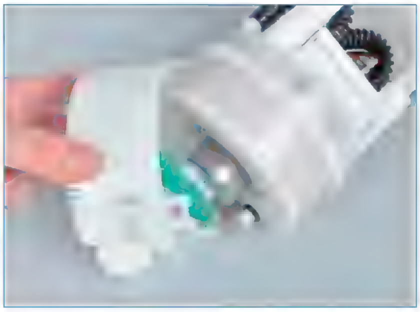
Release the retainer of the fuel level sensor.



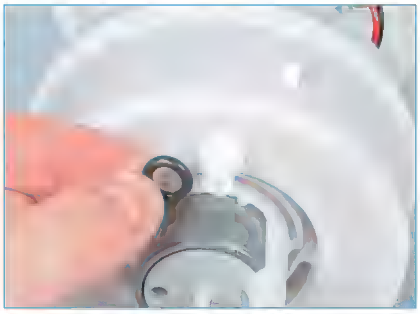
Removing the fuel level sensor.



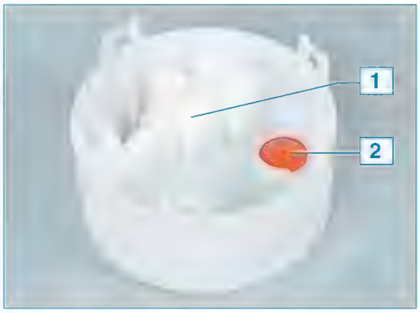
Use a screwdriver to release the three cup retainers...



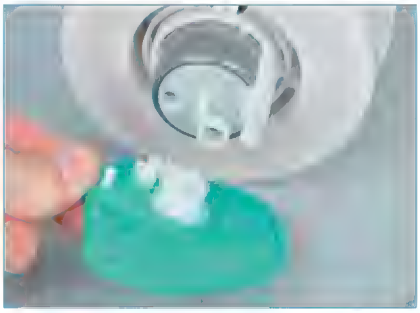
...and removing the cup from the filter housing.



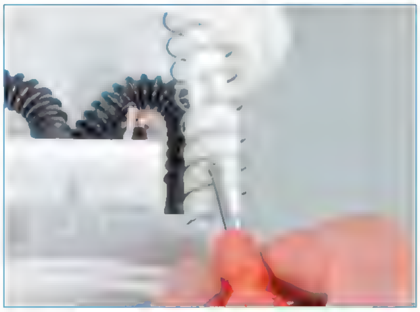
The fuel pressure regulator channel connection is sealed with a rubber O-ring.



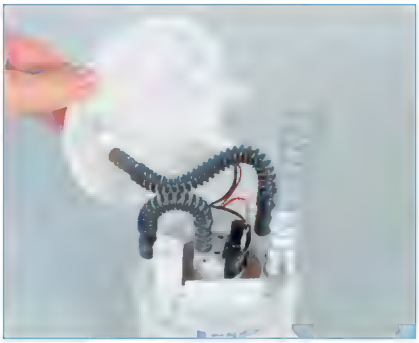
The cup contains the pressure regulator of the fuel 1 and the check spring-loaded valve 2.



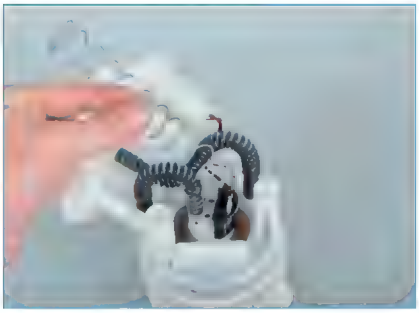
By pulling, remove the mesh filter from the fuel pump.
Now it can be rinsed or replaced.



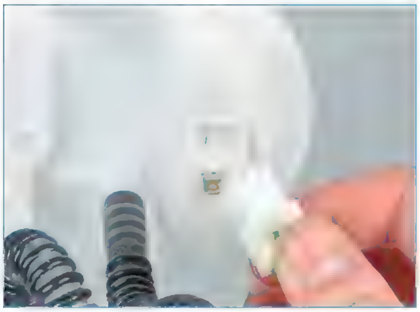
Use a screwdriver to pry off the retaining clip of the fuel module cover...



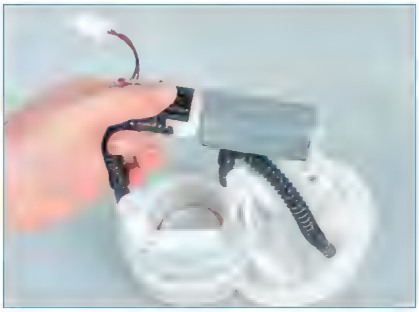
...and lift the cover...



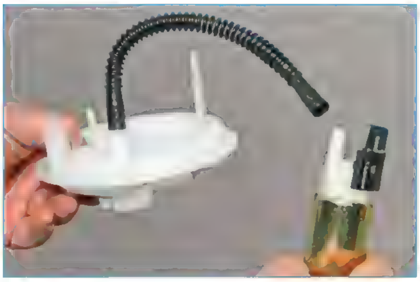
...releasing the spring.



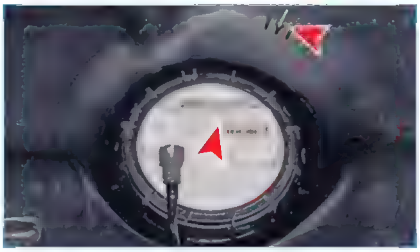
Disconnect the wiring plug of the fuel pump from the connector on the inside of the fuel module cover.



Remove the fuel pump from the fuel filter.
Heating the plastic corrugated hose on the pump inlet with a jet of boiling water from a kettle...



...remove the hose from the pump inlet. Assemble and install the fuel module in the reverse order.

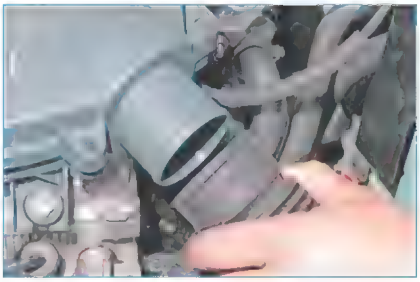


When installing the fuel module into the tank, the arrow on the module cover should align with the mark on the tank.

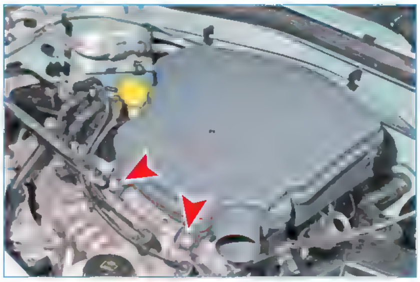
Slip the fuel line onto the module cover fitting until the spring clips snap into place. At the end of the procedure, turn on the ignition and check the fuel pump module connections for leaks.

Removing the air filter

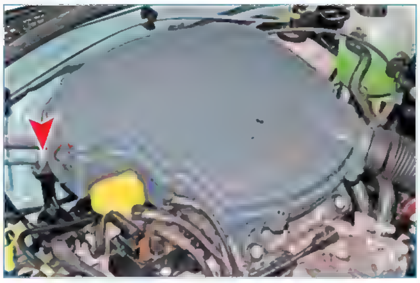
Remove the air filter to access the intake manifold, throttle assembly, fuel rail with injectors, and the engine cylinder head cover.



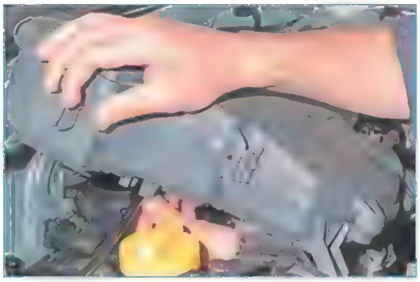
Disconnect the intake duct hose from the air filter housing inlet.



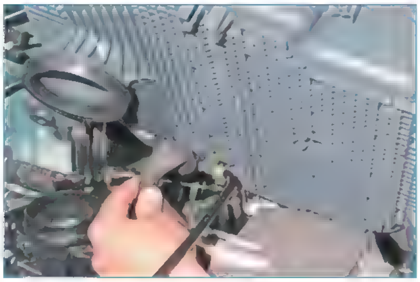
Using an E-12 socket, unscrew the two bolts securing the air filter housing to the cylinder head cover...



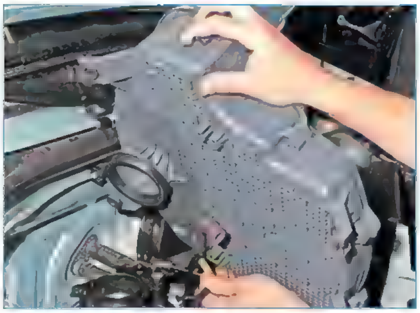
...and the two bolts securing the housing to the intake manifold (the left mounting bolt is not visible in the photo).



Lifting the filter housing, detach the plastic tube from the right holder on the housing that connects the charcoal canister to the throttle assembly.



Lift the filter housing a little higher and disconnect the main crankcase ventilation hose from the fitting on the cylinder head cover.



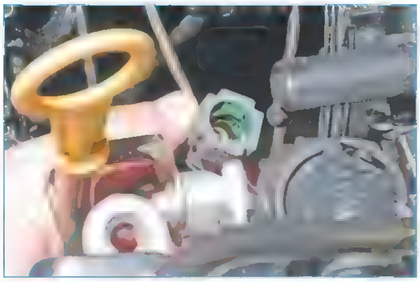
Pull out the plastic tube- from the left holder on the housing and remove the air filter assembly.

Remove the sealing ring.
Before installing the filter, inspect the rubber sealing ring at the connection between the filter housing neck and the throttle-body pipe. If the ring is damaged (tears, cracks) or has lost its elasticity, it must be replaced.

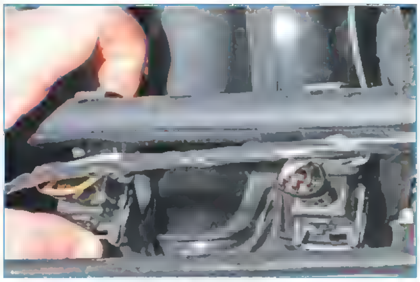
Also check the condition of the hose of the main crankcase ventilation circuit, and if there are defects, replace the hose.
Reinstall the air filter in the reverse order.

Removing the fuel rail and injectors

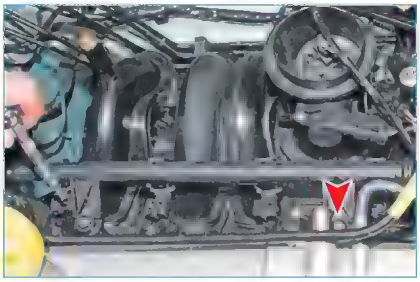
Remove the fuel rail to inspect the injectors and replace them if necessary. Relieve the pressure in the fuel system (see “Removal and disassembly of the fuel module,” p. 114). Disconnect the negative terminal of the battery. Remove the air filter (see “Removing the air filter,” p. 116).



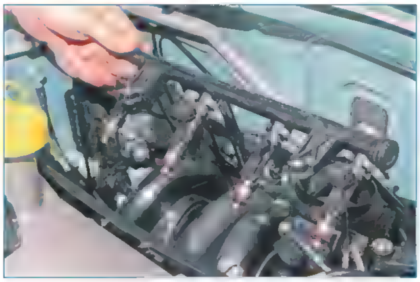
Compress the retainers and pull the fuel line fitting off the fuel rail fitting.



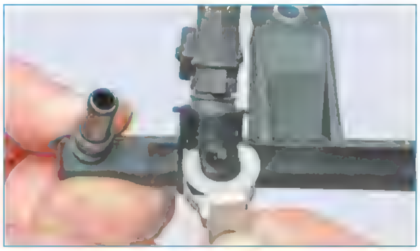
Pressing the spring clip, disconnect the wiring connector from the injector.
Similarly, disconnect the connectors of the wires from the remaining injectors.



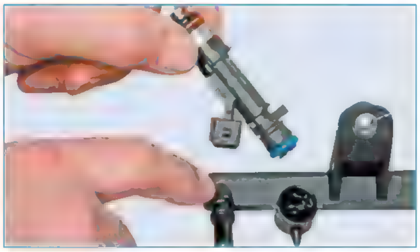
Using a Torx T-30 key, unscrew the two mounting bolts of the fuel rail.



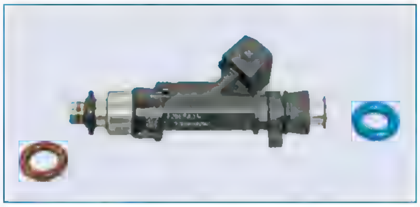
Sliding the fuel rail along the injector axes so that all the injectors are withdrawn from their seats in the intake manifold, remove the rail together with the injectors.



Remove the injector retainer.



Overcoming the resistance of the sealing ring, pull the injector out of the fuel rail.



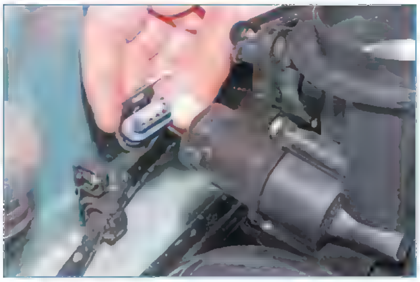
The injector is sealed with two rubber O-rings: blue — in the fuel rail, brown — in the intake manifold

Remove the remaining injectors in the same way.
Replace the sealing rings with new ones.
Before installation, apply a thin layer of engine oil to the injector sealing rings.
Reassemble and install the fuel rail with injectors in the reverse order.

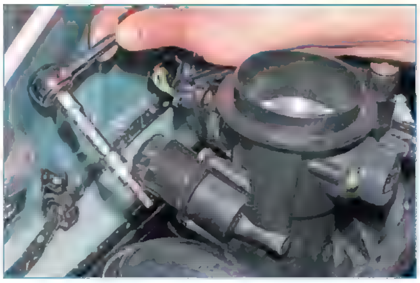
Removal of the idle speed control valve

Remove the idle speed control valve (ISCV) for replacement.
Disconnect the cable from the battery negative terminal.
Remove the air filter

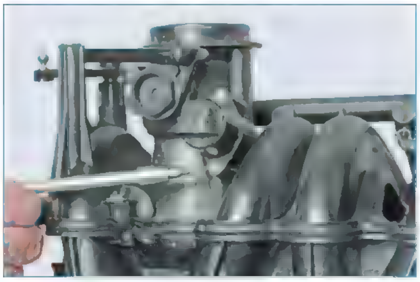
(see "Removing the air filter," p. 116).



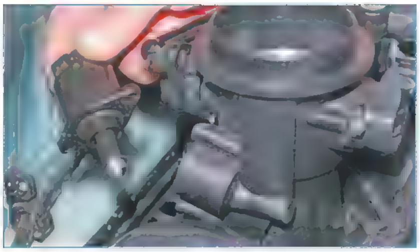
Pressing the latch, disconnect the wiring harness connector from the idle speed controller.



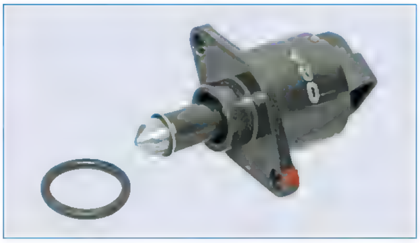
Use a Torx T-20 wrench to unscrew the two self-tapping screws securing the ISC to the throttle body.



For clarity, the operation is shown on the removed intake pipe.



Removing the idle speed regulator. Before installing the regulator, clean the valve seat in the throttle assembly, the air passage, and the surface beneath the regulator's sealing ring.



IAC connection to the throttle assembly sealed with a rubber ring

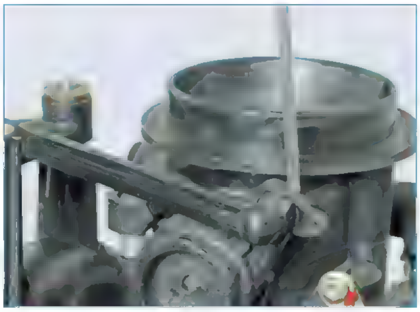
Apply engine oil to the new regulator sealing ring. Install the idle speed regulator in the reverse order of removal.

Removing the throttle body

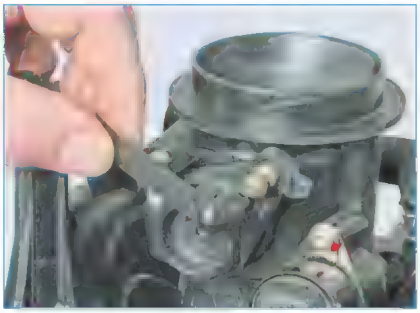
Remove the throttle assembly for replacement (if there are cracks, damage to the throttle lever), to clean the idle passages, or if the rubber seal that seals the connection between the assembly and the intake pipe is damaged.

Remove the air filter (see “Removing the air filter,” p. 116).

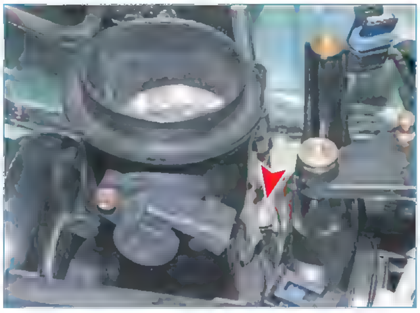
With the ignition off, disconnect the wiring harness connectors of the engine management system from the throttle position sensor (see “Removing the throttle position sensor,” p. 107) and the idle speed regulator (see “Removing the idle speed regulator,” p. 117).



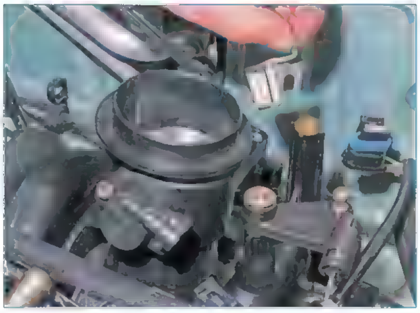
Pry up the rod end with a slotted screwdriver...



...disconnect the rod from the throttle drive lever (for shown for clarity on the removed engine).



Use a Torx T-30 wrench to loosen the self-tapping screw securing the throttle assembly bracket by 3–4 turns.



Remove the throttle assembly bracket.

Remove the throttle assembly, overcoming the resistance of the rubber sealing ring.

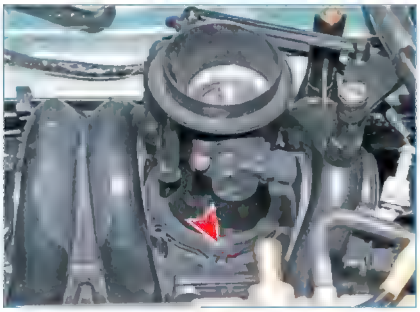
If necessary, remove the idle speed control valve and the throttle position sensor from the throttle body.

Removing from the throttle assembly up-sealing ring from the throttle body.

If the sealing ring has lost its elasticity or is damaged, it must be replaced with a new one.

Reinstall the throttle body in the reverse order.

When installing the throttle assembly we orient it like this...



...so that the projection on the intake pipe fits into the slot on the assembly housing.

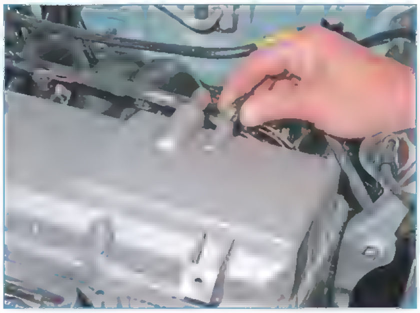
Removing the intake pipe, replacing gaskets

We remove the intake pipe when repairing the cylinder head or to replace the sealing gaskets at the joint between the pipe and the cylinder head.

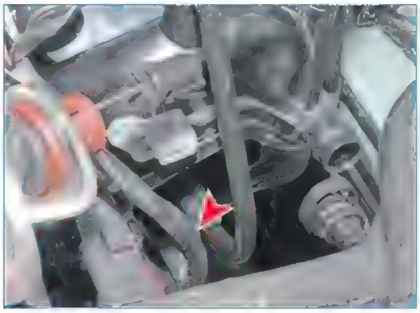
Disconnect the cable terminal from the battery's negative post. Remove the engine powertrain shield (see "Removing the powertrain shield," p. 283).

Disconnect the fuel feed tube fitting from the fuel rail connector and unplug the wiring harness connectors of the engine management system from the fuel injectors (see "Removing the fuel rail and injectors," p. 117). Disconnect the throttle cable end from the intermediate lever (see " Replacing the throttle cable," p. 121).

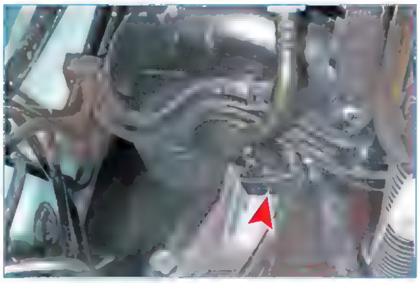
Disconnect the wiring harness connectors for the engine management system from the intake air temperature sensor (see “Removing the intake air temperature sensor,” p. 108) and the absolute pressure sensor (see “ Removing the absolute pressure sensor,” p. 108). Disconnect the vacuum booster check valve hose from the fitting on the intake pipe (see “Removing the vacuum booster check valve,” p. 231).



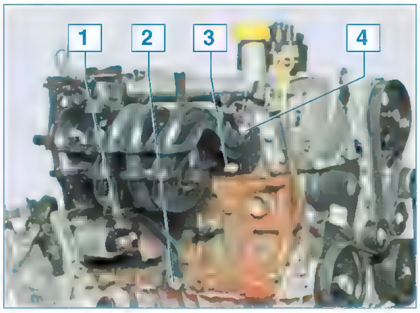
Disconnect the crankcase ventilation hose of the idle circuit from the fitting on the cylinder head cover.



On the left side of the pipe, remove the rubber tip of the adsorber hose from the inlet pipe fitting.

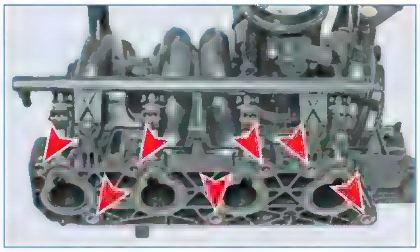


On the right side of the pipe, unfasten the holder of the fuel supply hose to the rail and pull the hose out of it. From under the vehicle...

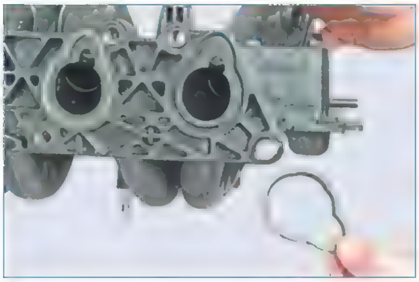


Using a 13 mm socket, unscrew nut 1 that secures the support bracket to the intake pipe and bolt 2 that secures the bracket to the engine block (shown on the removed power unit for clarity).

Remove the support bracket of the intake pipe. Using the same tool, unscrew the three nuts 3 of the lower mounting (from under the vehicle) and the four bolts 4 of the upper mounting of the intake pipe to the cylinder head (one nut and one bolt are shown — the others are not visible in the photo).



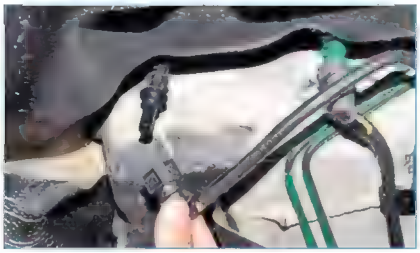
Mounting points of the intake pipe flange to the cylinder head inders (shown for clarity on the removed intake pipe). Remove the intake pipe assembly with the fuel rail and injectors, with temperature sensors and absolute air pressure sensor. If necessary, we remove the fuel rail with injectors and sensors.



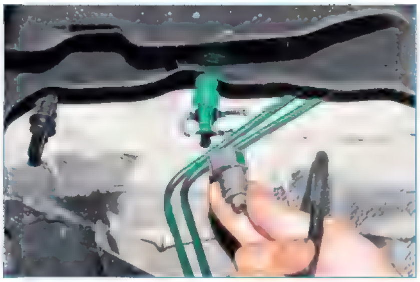
Remove the four sealing gaskets from the grooves of the intake pipe flange.
Install new gaskets and the intake pipe in reverse order.

Fuel tank removal

Remove the fuel tank for cleaning or replacement. Perform the work over an inspection pit or on a ramp with the tank empty.



Squeezing the retainers of the absorber tube tip, disconnect it from the fuel tank tube.



Similarly, disconnect the tip of the fuel supply pipe to the fuel rail from the fuel tank pipe.

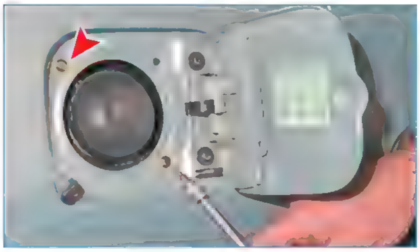
Place a hose over the fuel tank tube tip, lowering its end into a metal gasoline can. Disconnect the engine management wiring harness connector from the ignition coil (see "Removing the ignition coil," p. 110).

Next, remove relay K5 from the relay and fuse mounting block located in the engine compartment (see "Electrical equipment", p. 240).

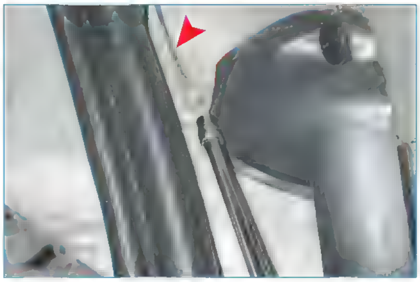
Install a jumper between sockets 3 and 5 of the relay power terminals (the socket number corresponds to the relay terminal number). When the ignition is switched on, the fuel pump will start and gasoline will be pumped from the tank into the canister.

When performing this operation, observe fire safety precautions!

After draining the fuel, switch off the ignition, remove the jumper and reinstall relay K5. Remove the hose from the tip of the fuel tank pipe.



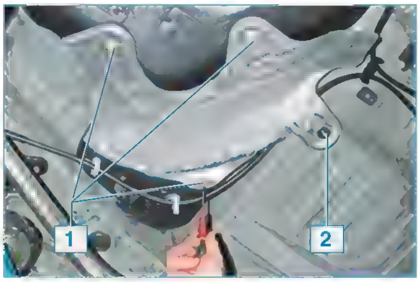
Using a Torx T-20 key, unscrew the two self-tapping screws securing the filler neck.



Using a 10 mm socket, loosen the nut securing the ground cable in the wheel arch of the right rear wheel.

Remove the end of wire “A” from the stud. Remove the exhaust system hanger cushions from the body brackets and disconnect the inlet pipe from the exhaust manifold (see “Removing the exhaust system,” p. 132).

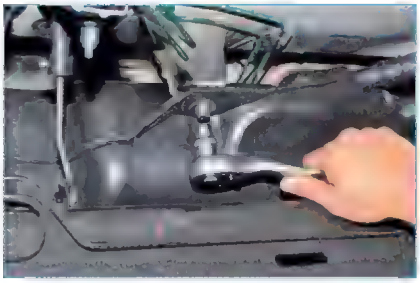
Move the exhaust system toward the left side of the vehicle and place a support under the inlet pipe.



Using a Phillips screwdriver, unscrew the screws of the three retainers 1 that secure the heat shield. Use pliers to loosen nut 2 that secures the heat shield. Remove the retainers...

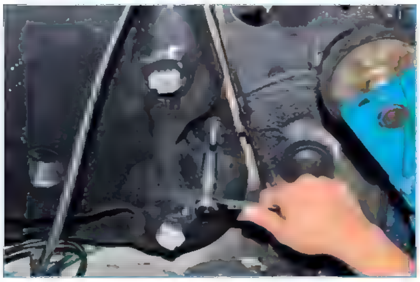
...and remove the heat shield. Release the parking brake cables from the holders on the fuel tank and on the underside of the body (see “ Replacing the parking brake cables,” p. 235).

Place an adjustable support under the fuel tank, inserting a wooden block to avoid damaging the tank.

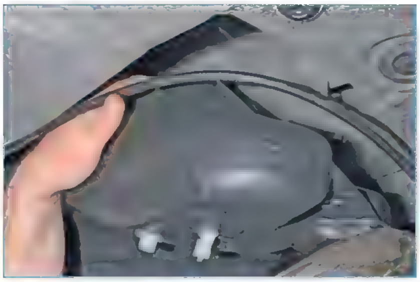


Use a 13 mm socket to loosen the bolt for the rear mounting of the fuel tank...

...and the bolt for the front mounting.



Using a deep 13 mm socket, loosen the two nuts (one on each side) of the fuel tank's side mounting.



Lower the fuel tank slightly and route the parking brake cables behind it.

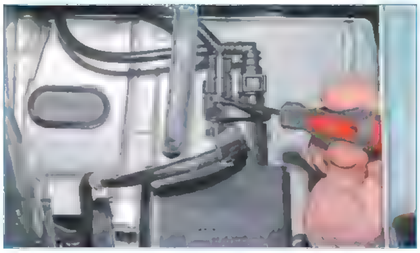
Lower the fuel tank onto the adjustable support and remove it. Install the fuel tank in the... in reverse order.

After filling the tank with fuel, turn on the ignition and check the fuel line connections for leaks.

Removing the evaporative emission system canister

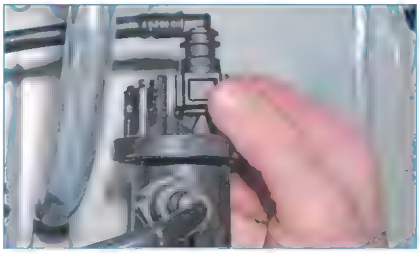
Remove the canister to replace it if the housing is not airtight (detectable by the smell of gasoline and visual inspection), and also if the canister purge solenoid valve is faulty (a defect is accompanied by unstable engine operation at idle).

Perform the work over an inspection pit or on a ramp. To remove the canister, remove the right front wheel splash shield (see " Removing front wheel mudguards and splash shields," p. 284).



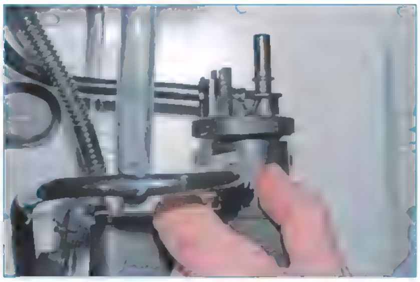
Use a screwdriver to depress the retainer of the engine management system wiring harness connector (the front bumper has been removed for clarity)...

...and remove the pad.

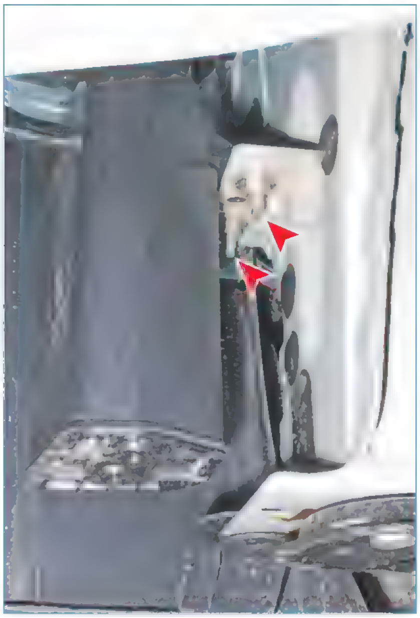


Squeezing the retainers of the tip of the tube that connects the purge solenoid valve of the adsorber to the intake pipe...

...remove the fitting of the tube from the valve nipple.



Similarly, remove the tube fitting that connects the adsorber to the fuel tank, from the fitting of the adsorber.



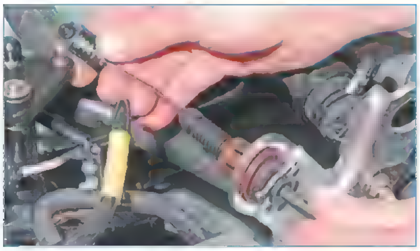
Using a 13 mm socket, loosen the two nuts securing the adsorber housing to the body...

...and remove the adsorber together with the transparent vent tube. Reinstall the adsorber in the reverse order.

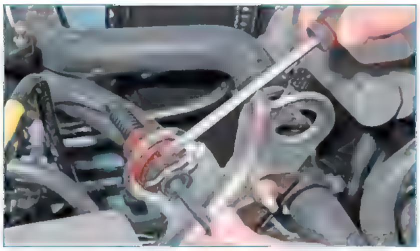
Throttle cable replacement

Replace the throttle cable when it sticks (the cable moves with difficulty in the sheath) due to broken or frayed wire strands, or when the cable is broken.

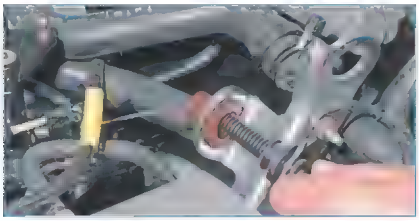
Remove the air filter (see " Removing the air filter," p. 116).



Disconnect the cable end from the intermediate throttle lever.

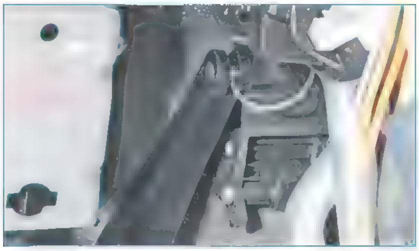


Using a slotted screwdriver, pry out the rubber bushing together with the cable sleeve tip from the plastic bushing of the bracket...



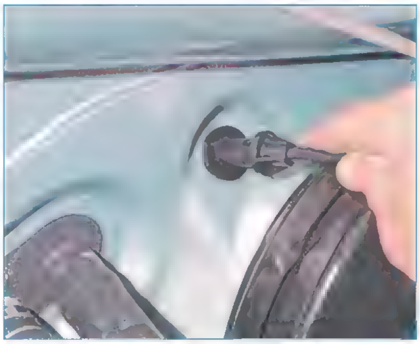
...and pull the cable end out of the plastic bushing.

Inside the vehicle, under the instrument panel...

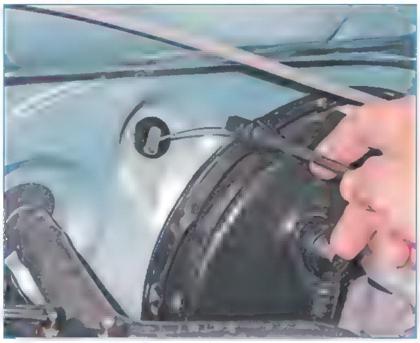


...pull the cable end out through the hole in the accelerator pedal, feeding the cable through the slot in the pedal.

In the engine compartment, pry up the cable sleeve bushing with a slotted screwdriver...



...pull the bushing out of the seal in the front panel.



Remove the cable end from the seal in the front panel.

of the seal in the front panel.

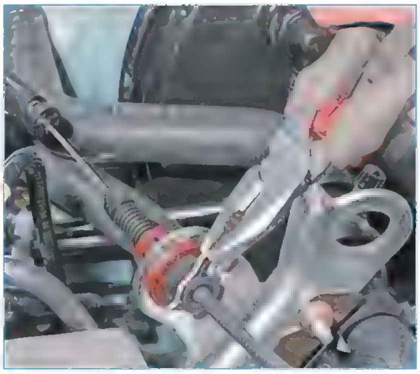
Pulling the cable out of the holder on the battery tray, remove the cable.

Install the new throttle cable in the reverse order. After installing the cable, the throttle drive must be adjusted.

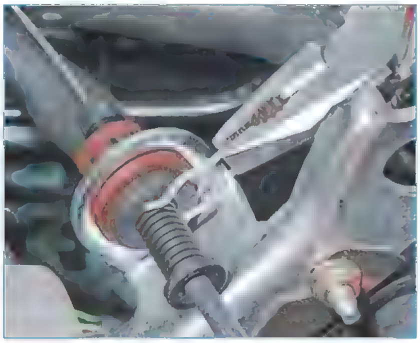
Throttle cable

With the accelerator pedal fully released, the throttle valve must be completely closed, and with the accelerator pedal pressed to the stop, the throttle valve must be fully open. The throttle drive lever must have no additional play.

To adjust the drive...



...using pliers, remove the retainer of the upper end piece of the cable sheath...

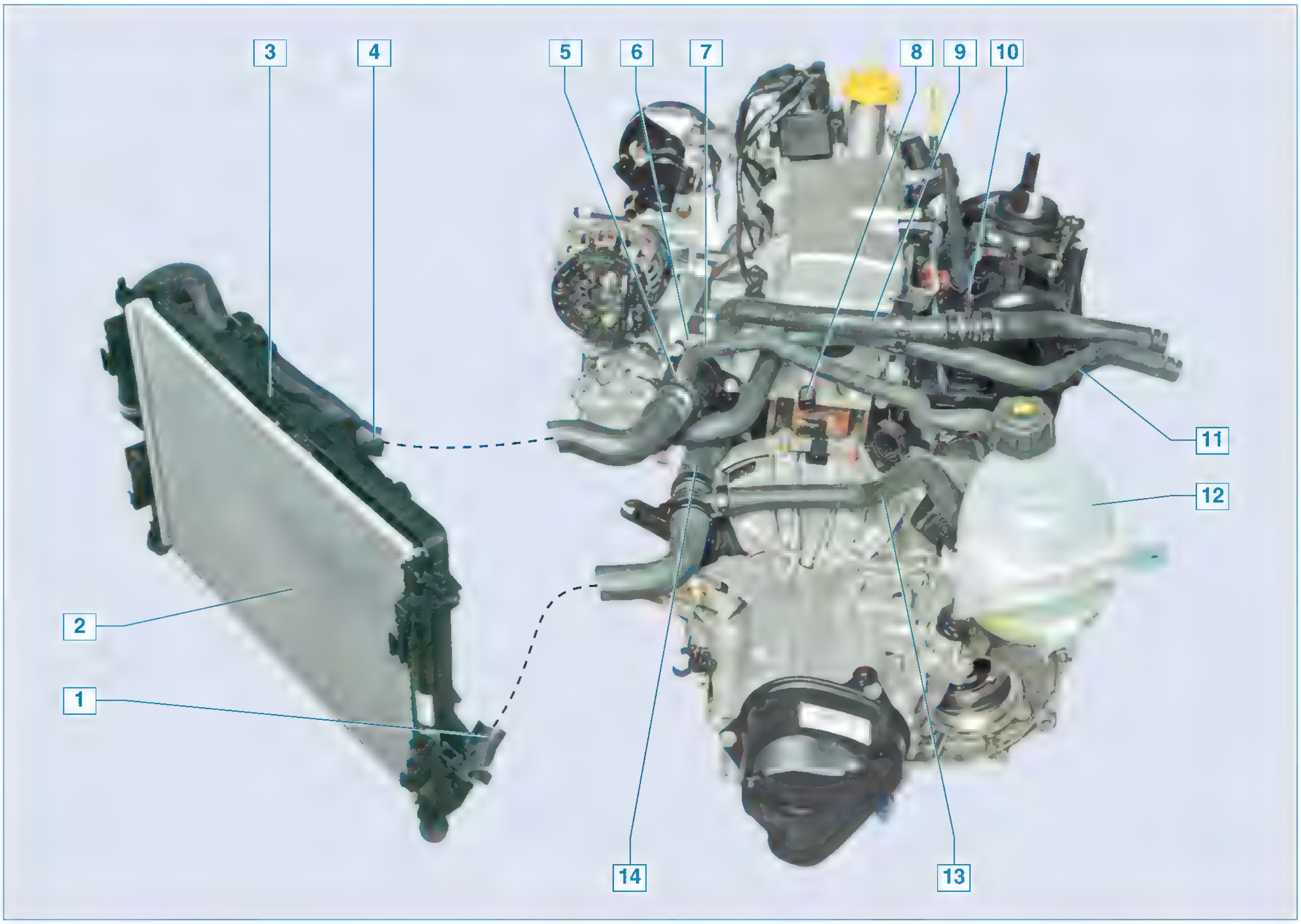


...and, after moving the end piece in the plastic sleeve of the bracket to the required position, insert the retainer into the annular groove on the end piece.

Pressing the accelerator pedal several times, make sure that the throttle valve opens and closes fully and smoothly, without sticking.

Engine cooling system 1.4–1.6 (8V)

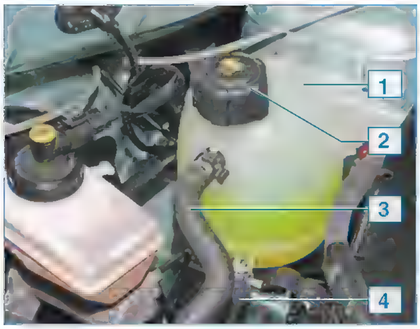
Description of the design



Engine cooling system: 1 – radiator outlet hose; **2** – radiator; **3** – fan shroud; **4** – radiator inlet hose; **5** – thermostat housing; **6** – cylinder head outlet pipe; **7** – vapor bleed hose; **8** – coolant temperature sensor; **9** – heater radiator inlet hose; **10** – air bleed fitting; **11** – heater radiator outlet hose; **12** – expansion tank; **13** – filler hose; **14** – coolant pump inlet pipe

The cooling system is liquid, closed-type, with forced circulation. It consists of an expansion tank, a coolant pu mp, the engine cooling jacket, a thermostat, connecting hoses, and a radiator with an electric fan. The heater radiator is connected to the cooling system. The system is filled with coolant through the expansion tank filler neck. The expansion tank is made of translucent plastic, allowing visual monitoring of the coolant level. The side of the expansion tank is marked MAX and MIN, between which the fluid level should be when the engine is cold. To the upper fitting of the tank a vapor drain hose is attached, connecting the tank to the thermostat housing. The lower tank fitting is connected by the filler hose to the radiator outlet (lower) hose and the pump inlet pipe.

The cooling system’s tightness is ensured by the inlet and outlet valves in the expansion tank cap.



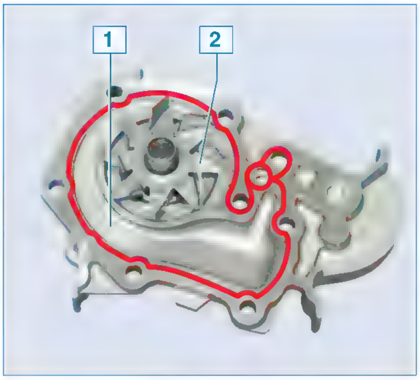
Expansion tank components: 1 – tank; **2** – filler neck cap; **3** – vapor return hose;**4** – filler hose

The pressure-release (overflow) valve maintains a pressure in the system that is higher than atmospheric pressure when the engine is hot. This raises the coolant's boiling point and reduces vapor losses. The intake (inlet) valve opens when the system pressure drops as the engine cools. At that time, the coolant level in the expansion tank falls. If the expansion-tank cap is lost, it must not be replaced with a sealed cap without valves.

There is a bleeder fitting on the hose that supplies fluid to the heater to release air from the cooling system when it is being filled. The fitting is covered with a cap.

The circulation of fluid in the cooling system is provided by the coolant pump. The coolant pump is a bladed centrifugal type and is driven by the timing belt from the toothed pulley of the crankshaft. It consists of a housing, a bearing assembly with a seal, an impeller, and a toothed pulley.

Expansion tank cap



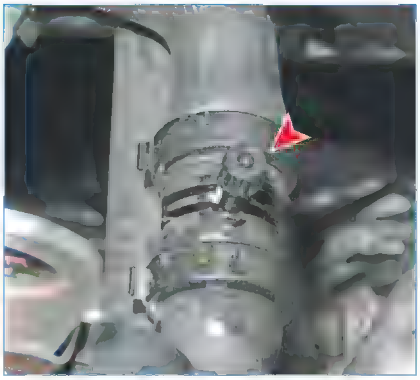
Coolant pump: 1 – housing; **2** – impeller

Fluid is delivered to the pump through the feed pipe located on the front wall of the cylinder block beneath the exhaust manifold.

From the pump, the fluid is delivered under pressure to the engine cooling jacket, and from there to the outlet pipe of the cylinder head, to which the thermostat housing is attached.

On a cold engine the thermostat valve is closed and blocks the thermostat housing outlet leading to the cooling system radiator. In this state all the fluid flows through the cylinder head outlet pipe to the heater radiator, bypassing the cooling system radiator, and returns to the pump — the short circulation loop. As the engine warms up, at a fluid temperature of 89 °C the thermostat valve begins to move, allowing fluid to flow to the cooling system radiator. At a temperature of 95±2 °C the thermostat valve opens fully and the fluid enters the cooling system radiator, where it releases heat to the ambient air.

The flow of coolant through the engine cooling jacket and the cooling system radiator forms the main circulation loop. Fluid continuously circulates through the heater core regardless of the thermostat valve position.



Bleeder fitting for releasing air from the cooling system

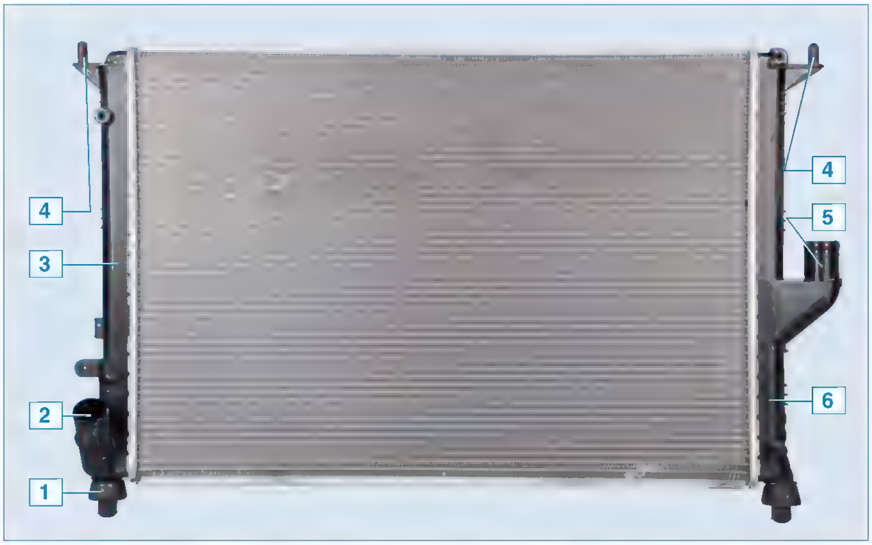
The cooling system radiator consists of two vertically positioned plastic tanks connected by aluminum tubes to cooling fins. Fluid enters the radiator through the upper hose and exits through the lower one. The radiator has no drain hole.

The electric fan is installed in the shroud behind the radiator. The fan blades are mounted on a hub with variable pitch.

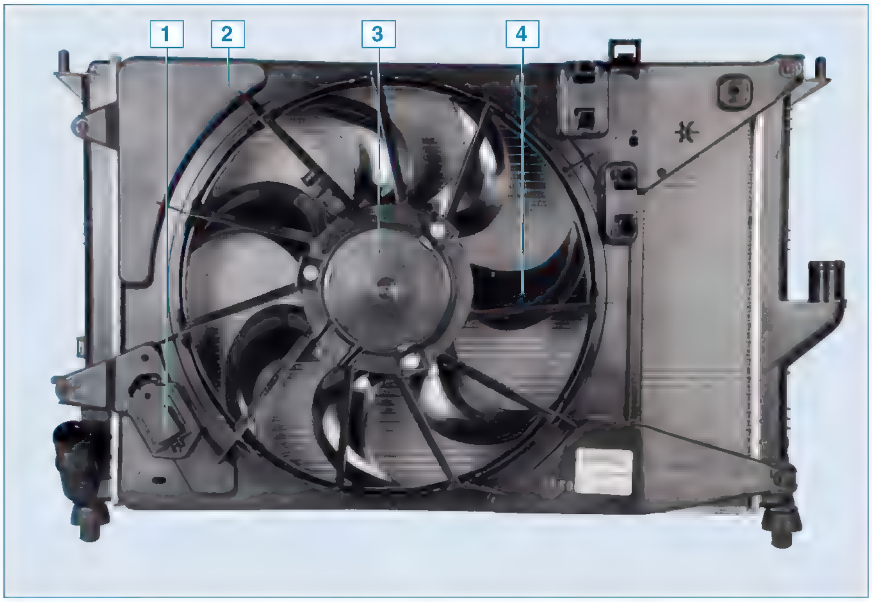
As the coolant temperature rises, the fan is switched on by command of the engine control unit (ECU) through a relay.

On vehicles equipped with air conditioning, an additional resistor is mounted on the fan shroud. It engages when the coolant temperature rises or when the air conditioning is switched on.

Thermostat



Radiator: 1 – lower mounting rubber cushion; **2** – outlet hose; **3** – left tank; **4** – upper mounting pin; **5** – inlet hose; **6** – right tank

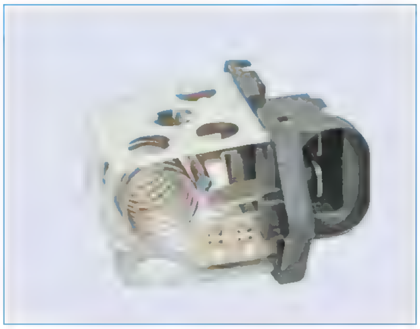


Cooling system fan assembly with radiator: 1 – auxiliary resistor; **2** – shroud; **3** – electric motor; **4** – impeller

The ECU turns the fan on through the auxiliary resistor and the fan runs at low speed. As the coolant temperature continues to rise and the refrigerant pressure reaches the threshold, the ECU activates the electric motor bypassing the resistor, and the fan runs at high speed.

The coolant temperature sensor is installed in the end of the cylinder head on the left side in the direction of travel of the vehicle (see “Removing the coolant temperature sensor,” p. 107).

The sensor sends information to the temperature gauge in the instrument cluster and to the electronic



Auxiliary fan resistor

Coolant temperature sensor

control unit of the engine management system.

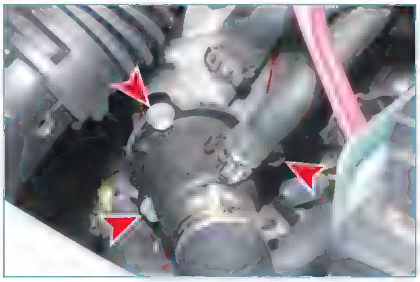
Removal and inspection of the thermostat

The thermostat should be replaced if the engine's thermal regime is disrupted, causing either overheating or insufficient warming.

When checking the thermostat on the vehicle after starting a cold engine, the lower radiator hose leading away from the radiator should remain cold for a while. At this time the thermostat valve is closed and the coolant circulates in the short circuit, bypassing the radiator. After the coolant temperature reaches 89 °C, the lower radiator hose should heat up quickly, indicating the start of coolant circulation through the main circuit.

We perform the work on an inspection pit or on a ramp.

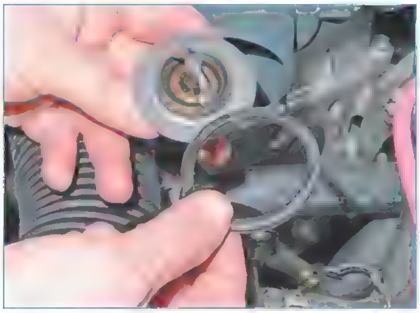
To remove the thermostat, drain the coolant (see “Engine coolant replacement 1.4–1.6 (8V)”, p. 38). To reduce the amount of work, the thermostat can be replaced without removing the hoses from the thermostat housing.



Using a 10 mm socket, loosen the three bolts securing the thermostat housing...

...and disconnect it from the outlet pipe of the cylinder head.

Remove the thermostat from the housing.

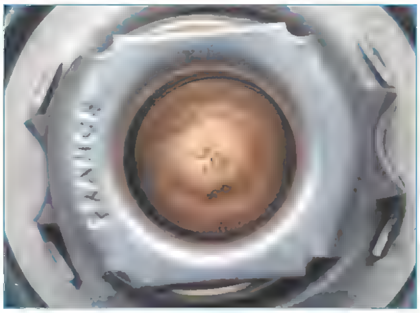


Remove the rubber gasket

from the thermostat.

If the gasket is damaged or has lost its elasticity, it must be replaced with a new one.

To test the thermostat, lower it into a vessel of water. Heat the vessel while stirring the water and monitoring with a thermometer for the start of valve opening. The valve stem should begin to extend at a temperature of 89 °C...



...indicated by the number “89”

on the thermostat valve.

At a temperature of 95±2 °C the valve must fully open — stem travel at least 8 mm.

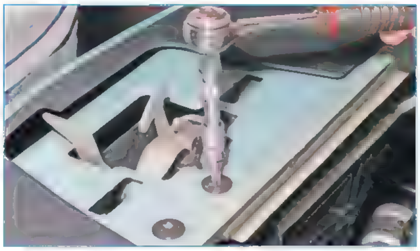
Reinstall the thermostat in reverse order. Tighten the mounting bolts carefully to avoid damaging

the plastic thermostat housing.

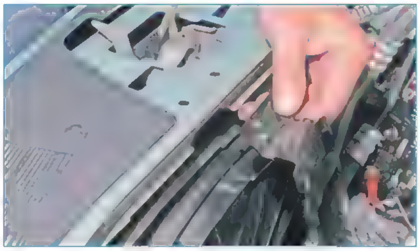
Removing the radiator fan

We remove the fan for replacement, and also when uninstalling the engine cooling system radiator and the air-conditioning system condenser. The procedure is shown on a vehicle with power steering. Disconnect the wire terminal from the battery’s negative terminal.

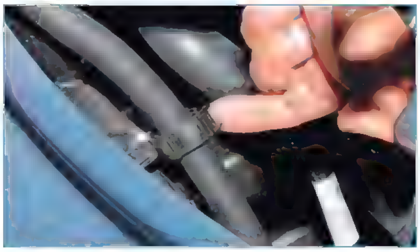
Slide the power steering fluid reservoir upward from the bracket on the upper crossmember of the radiator frame without disconnecting its hose, and move it aside.



Use a Torx T-30 wrench to loosen the two screws securing the reservoir bracket...



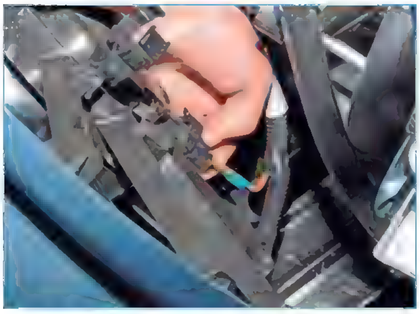
...and remove the bracket.



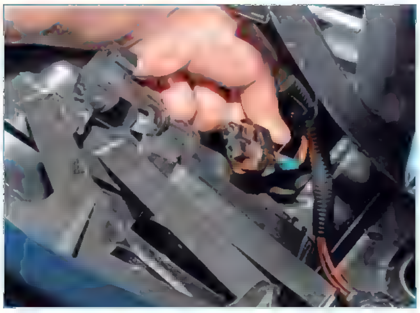
Squeeze the plastic retainer on the fan shroud...

...we remove from it the hose of the power steering reservoir.

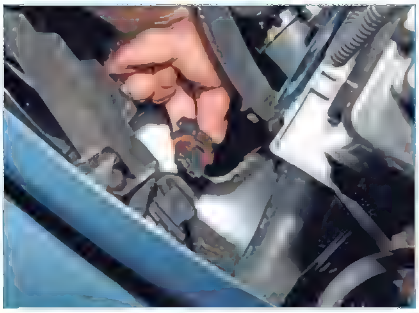
We remove the radiator feed hose from the fan shroud holder.



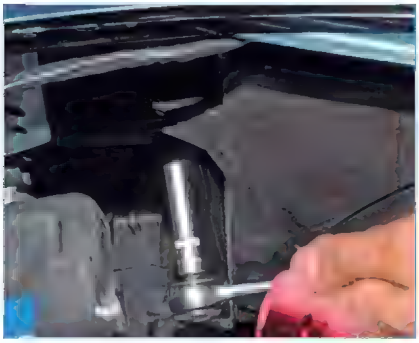
Pressing the latch of the engine management wiring harness connector...



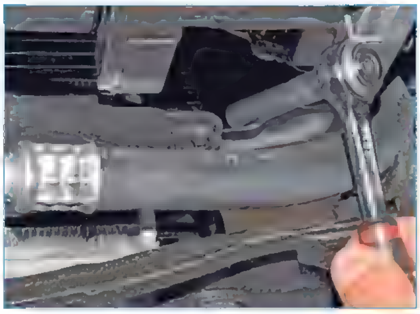
...disconnect the connector from the electric fan motor.



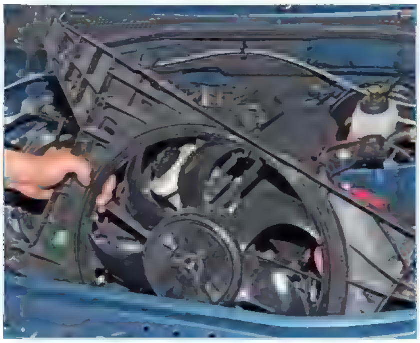
Similarly, disconnect the engine management wiring harness connector from the auxiliary resistor.



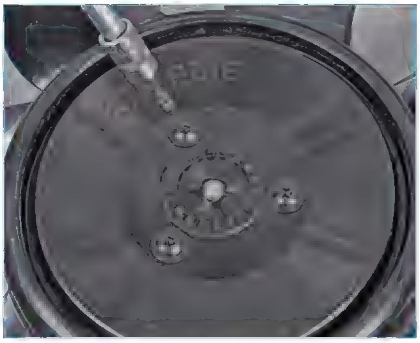
Using a 7 mm socket, loosen the two lower...



...and the two upper self-tapping screws securing the fan shroud to the radiator plastic tanks...

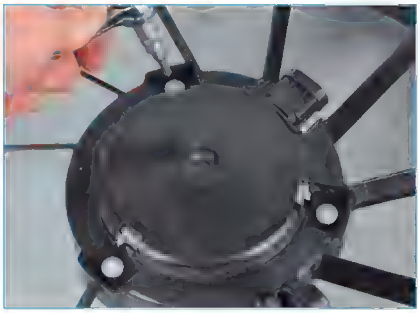


...and remove the fan assembly with its housing from the engine compartment.

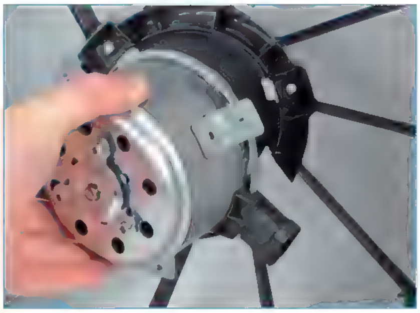


Using a Torx T-20 wrench, loosen the three screws securing the fan impeller to the electric motor...

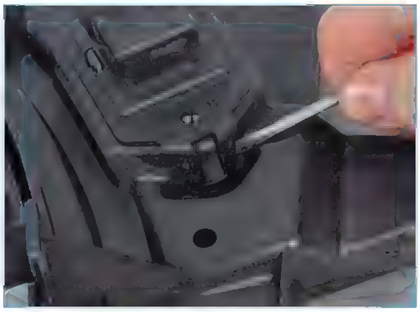
...and remove it.



Using a Torx T-25 wrench, loosen the three screws securing the electric motor to the fan housing...



...and remove it.
If replacement is required, additional- of the potentiometer...



...use a screwdriver to depress the resistor retainer...

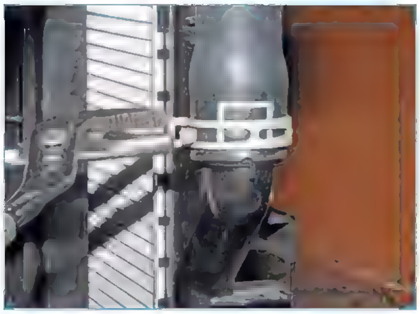
...and remove it from the fan housing.
Reinstall the radiator cooling system fan in reverse order.

Removing the Radiator

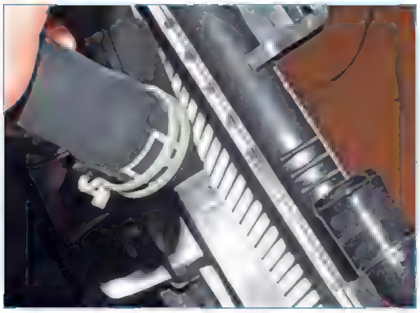
Remove the radiator to check it for leaks (if a leak is suspected) or to replace it if damaged.

Perform the work on an inspection pit or a ramp. Remove the front bumper (see “Removing the front bumper on Logan”, p. 286; “Removing the front bumper on Sandero and Sandero Stepway”, p. 287). Drain the coolant (see “Replacing engine coolant 1.4–1.6 (8V)”, p. 38).

Remove the radiator fan (see “ Removing the radiator fan”, p. 126).



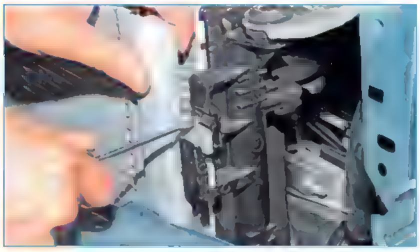
Using slip-joint pliers, spread the clamp securing the inlet hose...



...and remove the hose from the radiator fitting radiator.

The air conditioning condenser is mounted on plastic brackets molded as one piece with the radiator’s plastic tanks.

To remove the condenser without disconnecting its supply and return pipes—refrigerant coolant...

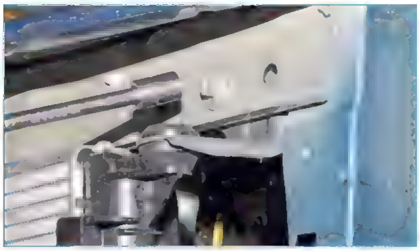


...use a screwdriver to press the retainer of the upper condenser bracket and the lower one (not visible in the photo).

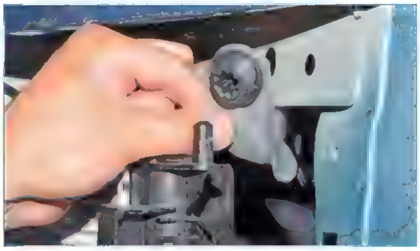
Lift the left side of the condenser so that the bracket retainers—the stays would remain in the pressed position.

Perform the same operations on the right side of the condenser, then lift the condenser, disengaging its brackets from the radiator tabs...

...and carefully lower the condenser to the floor, taking care not to damage the tubes that connect it.

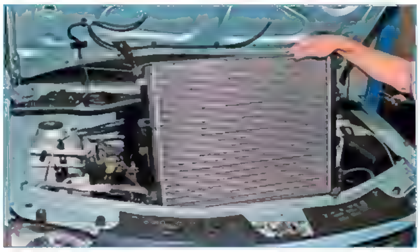


Using a 10 mm socket, loosen the bolt securing the left upper radiator mounting bracket...

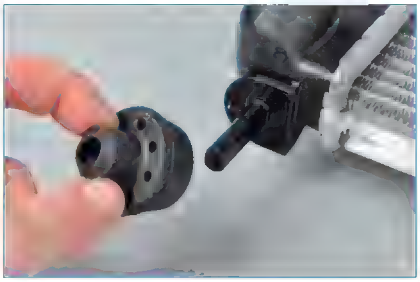


...and remove the bracket with the rubber pad from the radiator's left pin.

Similarly, remove the right bracket from the radiator's right pin. Lift the radiator so the rubber cushions of the lower mounts come out of the holes in the crossmember of the subframe...



...and pull the radiator out of the engine compartment.



Remove the rubber pads of the radiator's lower mounting from the radiator pins.

If necessary, remove the rubber pads from the upper mounting brackets. Replace pads that are cracked or have lost their elasticity.

Check the radiator for leaks in a water bath. Plug the radiator hoses with wooden stoppers, apply compressed air at about 0.1 MPa (1 kgf/cm^2) to it through one of the stoppers and lower the radiator into the water bath for no less than 30 s. No air leakage (bubbles) should be observed. Replace any leaky radiator with a new one.

Install the radiator in reverse order.

If the rubber pads of the radiator's lower mount came off together with it, insert the pads into the subframe openings first when installing the radiator.

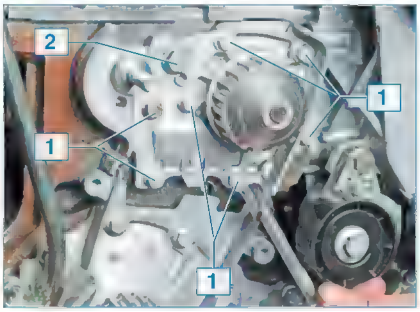
Fill the coolant into the cooling system and bring the fluid level in the reservoir up to the proper mark.

Removing the coolant pump

The pump is replaced as an assembly if bearing noise occurs, if the pulley rotates stiffly when the drive belt is removed, if there is excessive radial play in the pump shaft, or if fluid leaks from the inspection hole.

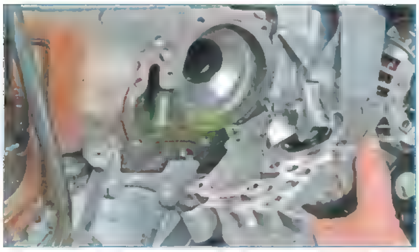
The pump is fitted with sealant. Drain the coolant (see "Engine coolant replacement 1.4–1.6 (8V)", p. 38).

Remove the timing drive toothed belt and the tensioner pulley (see " Inspection and replacement of the timing drive belt", p. 34).



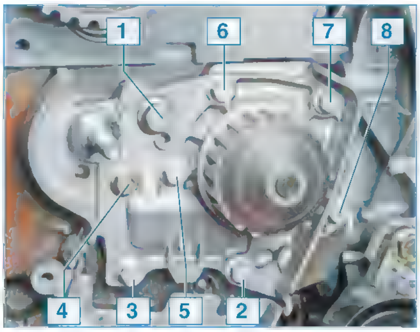
Using a 10 mm socket, unscrew the seven bolts 1, and using a 13 mm socket, remove the one bolt 2 securing the pump to the cylinder block.

Pry up the pump housing lip with a slotted screwdriver and pull the pump away from the engine block.



Remove the coolant pump.

Before installation, clean the pump's mounting surfaces of any remnants of the old sealant and fluids and the cylinder block. Apply a thin layer of sealant to the pump's mounting surface and to the threaded portions of the pump mounting bolts.



Tightening sequence for the coolant pump mounting bolts

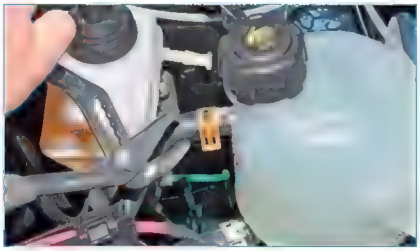
Install the coolant pump in the reverse order.

Tighten the pump mounting bolts to the specified torques (see " Appendices", p. 315).

Removing the expansion tank

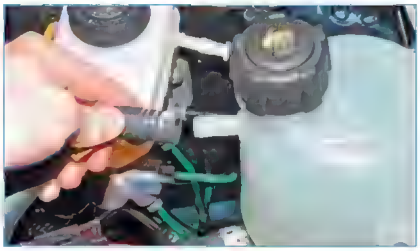
Remove the expansion tank for replacement.

The expansion tank is attached to the body bracket with two nuts. If there is coolant in the expansion tank, place a large container under the vehicle in the area where the tank is located to collect the fluid.

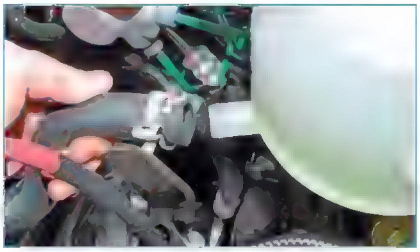


Using adjustable pliers, pinch the clamp securing the steam/discharge hose...

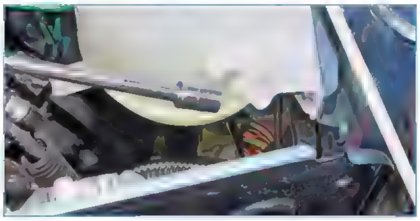
the hose...



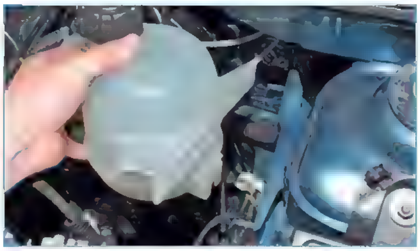
...and remove the hose from the reservoir fitting. Using adjustable pliers, pinch the clamp securing the filler hose...



...and remove the hose from the reservoir fitting. Plug the hole in the hose with a stopper of the appropriate size.



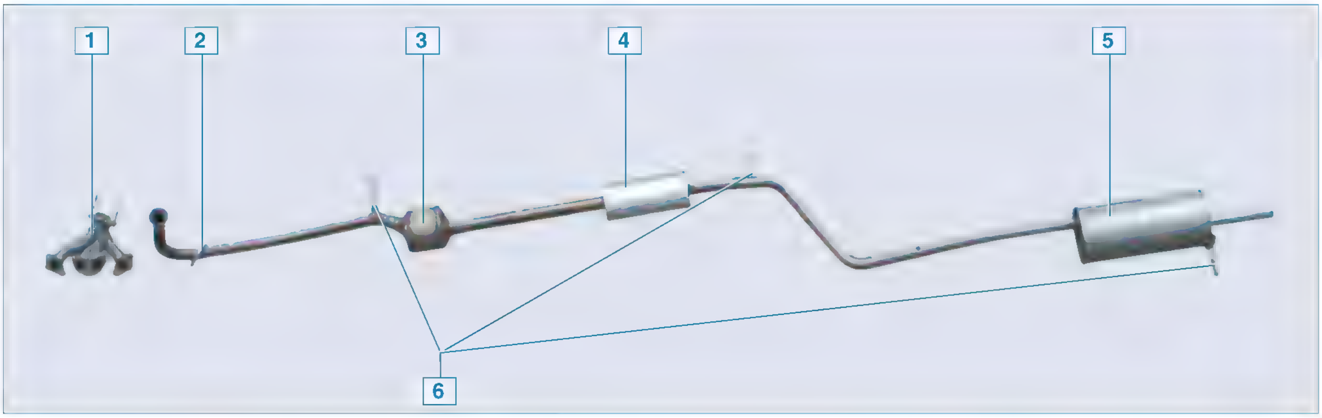
Use a 10 mm socket with an extension to loosen the two nuts securing the tank...



...remove it from the studs on the body bracket and withdraw the reservoir from the engine compartment. Install the expansion tank in the reverse order. Refill the cooling system with coolant (see "Engine coolant change 1.4–1.6 (8V)", p. 38).

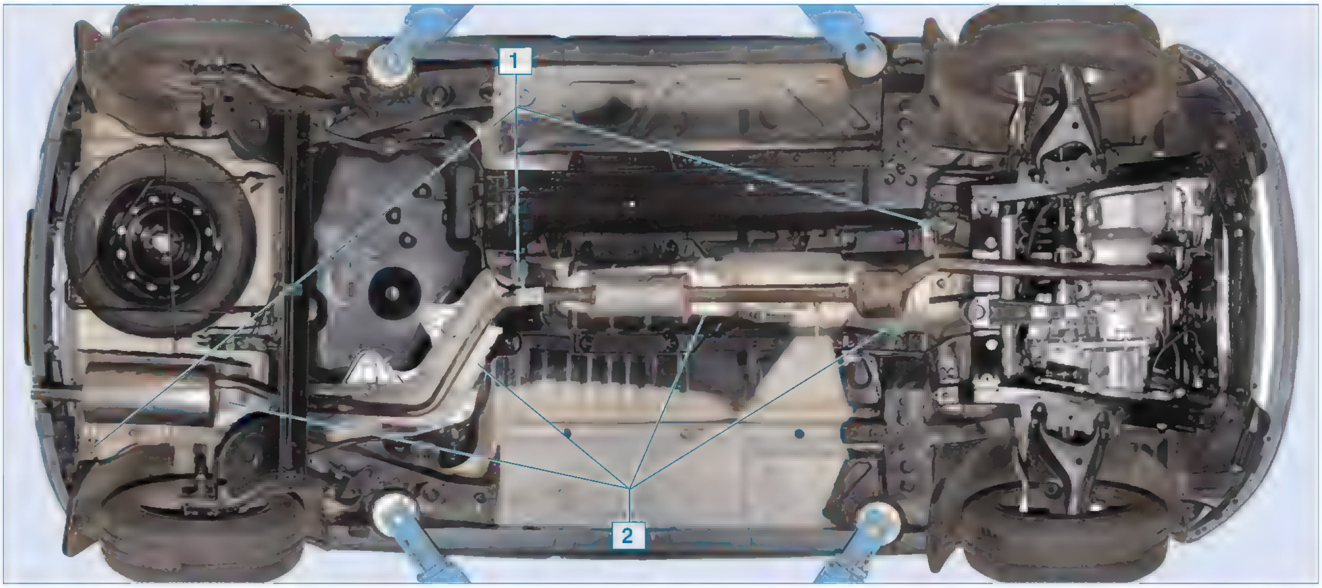
Exhaust system of the 1.4–1.6 (8V) engine

Description of construction

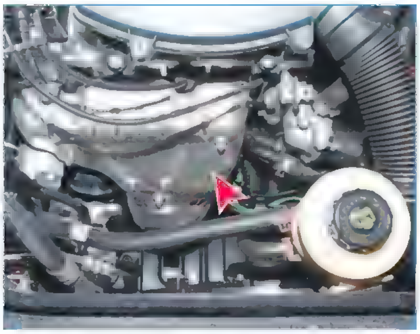


Exhaust gas system: 1 – exhaust manifold; **2** – clamping plate for fastening the inlet pipe to the exhaust manifold; **3** – catalytic converter; **4** – auxiliary silencer; **5** – main silencer; **6** – system suspension bracket

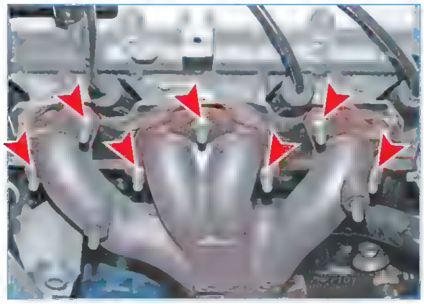
The exhaust system consists of the exhaust manifold, the inlet pipe with a catalytic converter for exhaust gases, the auxiliary and main mufflers, and the pipes connecting them. All elements of the system, except the exhaust manifold, are welded into a single unit. The flange of the exhaust manifold is connected by a ball joint to the flange of the inlet pipe. The exhaust system is suspended from the body on three rubber cushions. Above the converter, the auxiliary



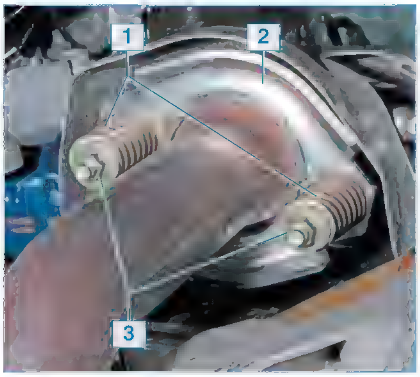
Location of the exhaust gas system on the vehicle (shown on a Sandero): 1 – rubber mounting pad of the exhaust system suspension; **2** – heat shield



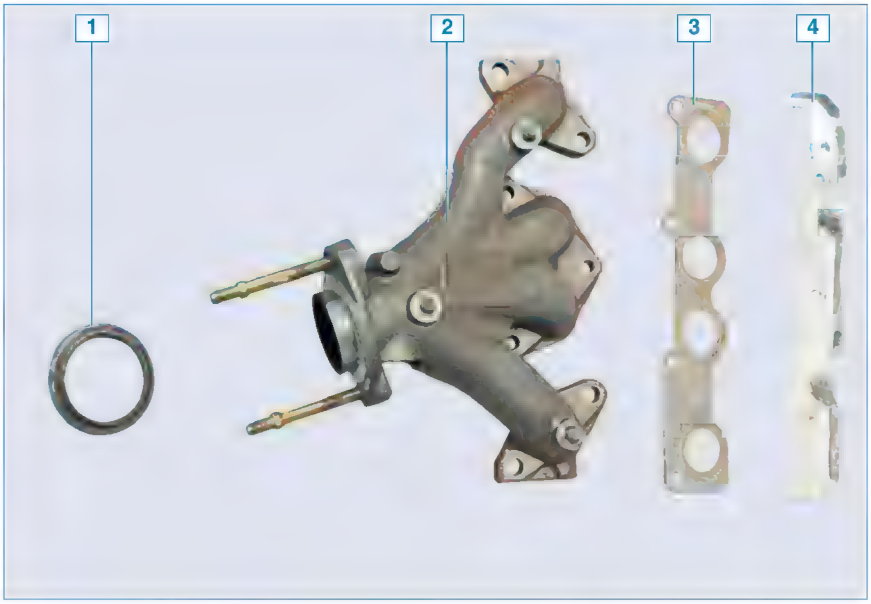
The exhaust manifold is covered by a heat shield...



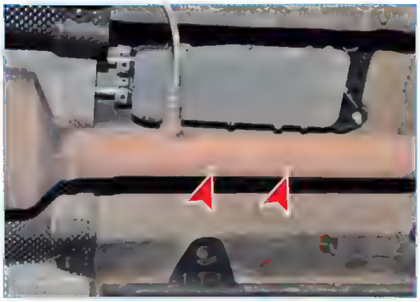
...and is fastened with seven nuts to the studs of the cylinder head (heat shield removed for clarity)



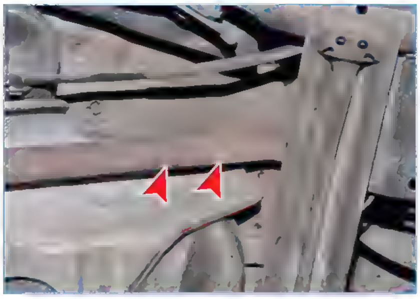
Connection of the front pipe to the exhaust manifold: 1 – spring;**2** – pressure plate; **3** – nut



Exhaust manifold: 1 – sealing ring for the connection of the manifold to the front pipe; **2** – exhaust manifold; **3** – sealing gasket for the connection between the manifold and the cylinder head; **4** – exhaust manifold shield



Location of the marks on the pipe between the catalyst and the auxiliary silencer



Label placement on the pipe between the auxiliary and main silencers

and heat shields are installed around the main mufflers and near the fuel tank.

A metal sealing gasket is installed between the exhaust manifold and the cylinder head.

To seal the hinged connection between the exhaust manifold and the intake pipe, a ring made of composite material with a spherical outer surface is fitted onto the flange of the exhaust manifold, while an internal spherical surface is formed in the flange of the intake pipe. The flange connection is tightened by a pressure plate via two conical springs fitted onto the studs of the exhaust manifold. The springs are compressed by nuts screwed onto the studs.

A control oxygen concentration sensor is installed in the pipe after the exhaust manifold. A diagnostic oxygen concentration sensor is installed downstream of the catalytic converter.

The catalytic converter is designed to reduce emissions of carbon monoxide, nitrogen oxides, and unburned hydrocarbons into the atmosphere. For the converter to operate properly, the composition of the exhaust gases (in particular, their oxygen content) must be within strictly defined limits. This function is performed by the engine control unit (ECU), which determines the amount of fuel supplied depends on the signals from the oxygen concentration sensors.

Connect the pipes of the new assembly to the exhaust system pipes using a special clamp

If lead compounds are present in the exhaust gases, the catalytic converter and oxygen sensors will fail quickly. Therefore, operating the vehicle on leaded gasoline is strictly prohibited, even briefly.

A faulty ignition system or fuel supply system can also cause the converter to fail. When misfires occur, unburned fuel entering the converter burns there and sinters the catalyst block, which can lead to clogging of the exhaust system and engine stall (or severe loss of power).

Mufflers and the catalytic converter are non-serviceable units and must be replaced with new ones when they fail. Spare parts include the converter with the inlet pipe, additional and main mufflers with pipes of specified lengths, and special clamps for joining the pipes. To replace an individual element of the one-piece system, marks (punches) are made at two points on its pipes to indicate where the pipes can be cut.

Maintenance of the exhaust system consists of periodic inspections, checks for joint tightness and through corrosion, and includes tightening of loosened connections and replacement of rubber suspension mounts.

Replacement of exhaust system hanger insulators

If the rubber suspension mounts of the exhaust system are damaged, knocks under the vehicle floor may be heard during driving or when starting the engine due to parts of the system contacting the body. The mounts can be torn, lose elasticity, or have cracks and rips.

Work is carried out on an inspection pit or a ramp.
All insulators have the same construction and mounting method, so the replacement is shown using one as an example; the others are replaced in the same way.

To remove the insulator, insert the shaft of a screwdriver into the hole in the insulator where the pipe bracket is inserted. While levering the insulator away from the bracket with the screwdriver, spray a penetrating fluid such as WD-40 into the insulator hole. Perform the same operation on the other insulator hole where the body bracket fits.

Pull the insulator off the two brackets alternately. If the insulator is to be replaced, it can also be removed from the brackets by cutting it with a knife.

Before installing the new gasket, clean both brackets and wet them with a soapy solution...

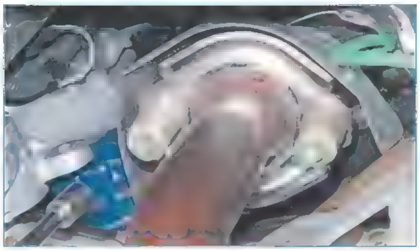
...and first place the cushion onto the body bracket and then onto the pipe bracket.

Removal of the exhaust system

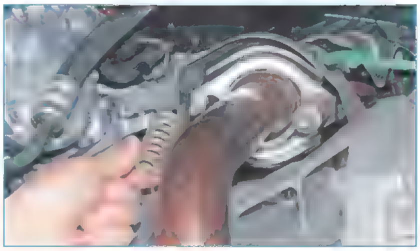
To avoid burns, it is recommended to begin work only after the exhaust system has cooled down.

Components of the exhaust system welded into a single unit can be removed without cutting them into pieces.
Perform the work over an inspection pit or on a ramp.
To remove the main muffler from the space between the body and the rear suspension beam, raise the rear of the vehicle and remove the left rear suspension spring (see “Spring removal,” p. 210).

Remove the oxygen concentration sensors (see “Removal of oxygen concentration sensors,” p. 109).
Remove in turn the three rubber exhaust system mounting cushions from the body brackets or from the exhaust system brackets (see " Replacing the exhaust system mounting cushions", p. 132).



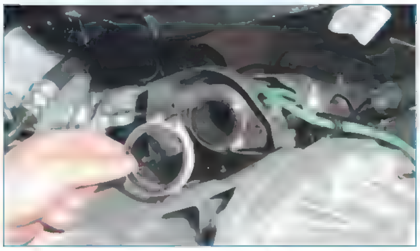
Using a 10 mm socket with an extension, loosen the nut securing the inlet pipe flange to the exhaust manifold flange...



...and remove the spring.

Similarly, unscrew the nut and remove the spring from the other stud of the exhaust manifold. Slide the clamp plate down the inlet pipe. Pressing the left part of the rear suspension beam downward, move the exhaust system forward (in the direction of vehicle travel), ensuring that the muffler hanger bracket does not catch on body components and does not snag the parking brake cable or the ABS sensor wiring harness (if equipped).

Before installing the exhaust system, check the condition of the sealing ring of the ball joint at the flange connection between the inlet pipe and the exhaust manifold.



Remove the sealing ring from the exhaust manifold flange. If the ring is cracked or the sealing spherical surface is damaged, replace the ring with a new one. Install the exhaust system in the reverse order.

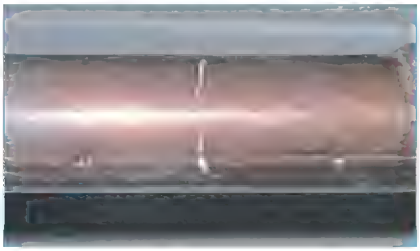
Replacement of exhaust system components

We replace parts of the exhaust system in cases of burn-through, through corrosion, significant mechanical damage, or failure of the catalytic converter.

The work is performed over an inspection pit or on a ramp.
If necessary, remove the sensors oxygen concentrations (see "Removing the oxygen concentration sensors," p. 109). Because the exhaust system is non-disassemblable (except for the connection of the exhaust manifold to the inlet pipe), replacing an individual component requires cutting the replaceable part out of the system piping. Spare parts are supplied separately and include the auxiliary and main mufflers as well as the catalytic converter with its inlet pipe. You must also purchase one or two special clamps (two when replacing the auxiliary muffler) to connect the parts.

To avoid burns, it is recommended to begin work only after the exhaust system has cooled.

Before replacing the inlet pipe with the catalytic converter or the auxiliary muffler, mark the cutting location on the pipe that connects the converter and the auxiliary muffler. To do this, divide in half the distance (which is 80 mm) between the two marks on the pipe...



...and mark the cutting spot with chalk or a marker.
Cut the pipe along the marked line using a cutoff tool.

To prevent fire, make sure that no flammable materials are present in the area where sparks may scatter!

After cutting the pipe, you can replace the intake pipe with the catalytic converter. To do this, disconnect the intake pipe from the exhaust manifold (see "Removing the exhaust system," p. 132) and remove the intake pipe with the catalytic converter. After installing the new intake pipe with the converter, join the pipes between the converter and the auxiliary silencer with a special clamp (a clamp for a 45 mm diameter pipe is required).

To replace the auxiliary or main muffler, you need to cut the pipe that connects them. To do this, draw a line with chalk or a marker halfway between the two marks on the pipe that connects the mufflers (in the area of the left spring of the vehicle's rear suspension). Cut the pipe along the marked line with a hacksaw for metal.

To eliminate the possibility of fuel vapor ignition, do not use a cutting wheel, since the cut location is close to the fuel tank and the fuel lines.

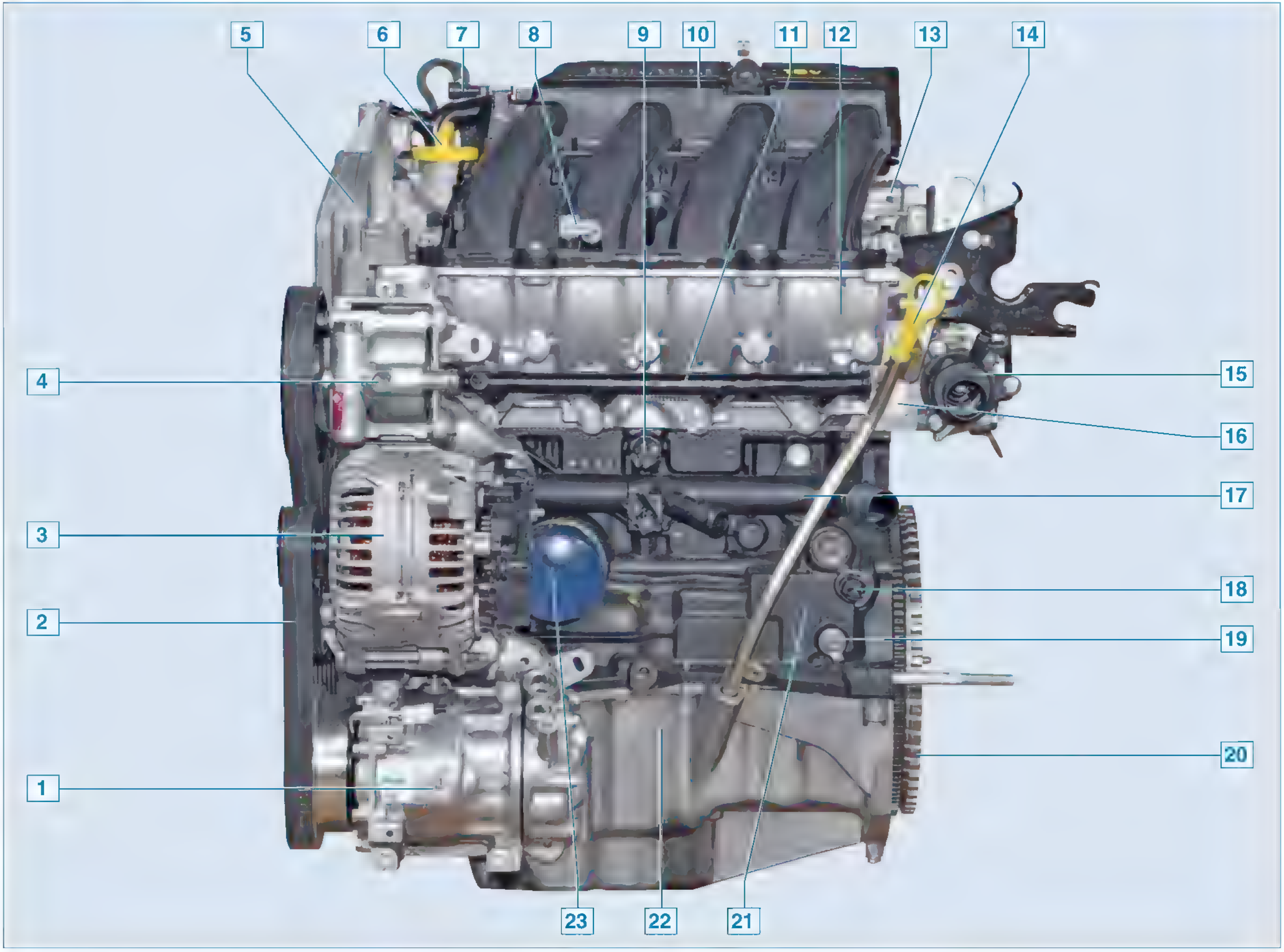
When replacing the main muffler, pull the muffler bracket out of the rubber hanger (see "Replacing exhaust system hangers," p. 132) and remove the muffler.

When replacing the auxiliary muffler, also cut the pipe connecting the muffler to the catalytic converter (see above) and remove the auxiliary muffler by pulling its pipe bracket out of the rubber hanger.

When installing a new main or auxiliary muffler, use a special clamp (for a 40 mm diameter pipe) at the pipe connection.

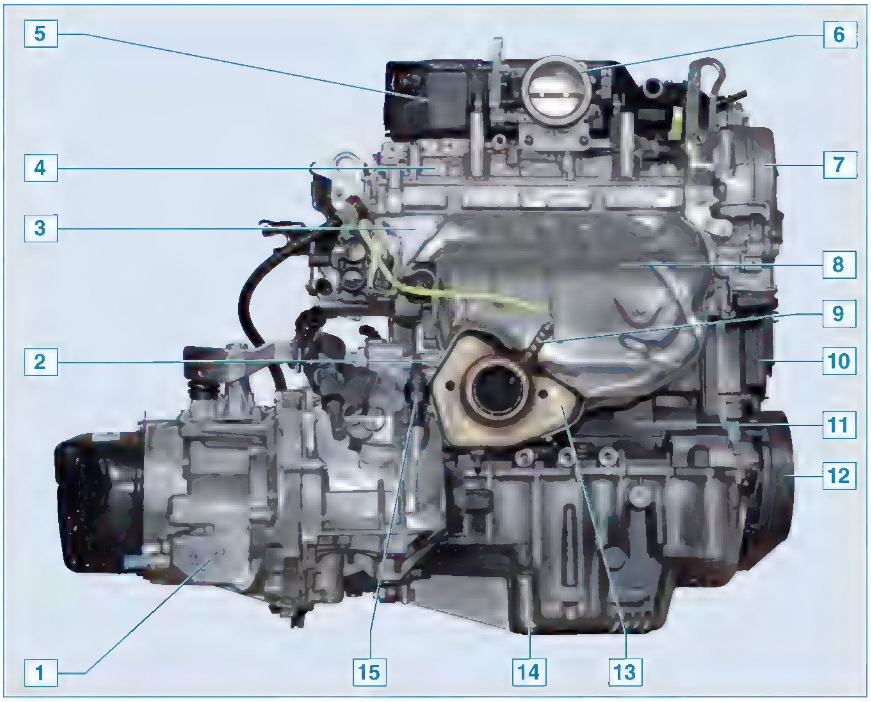
Engine 1.6 (16V)

Description of the construction



Engine (view from the front in the direction of vehicle travel): 1 – air conditioning compressor; **2** – auxiliary drive belt; **3** – alternator; **4** – power steering pump; **5** – upper timing belt cover; **6** – oil filler cap; **7** – intake manifold absolute pressure sensor; **8** – intake air temperature sensor; **9** – knock sensor; **10** – intake manifold; **11** – fuel rail with injectors; **12** – intake pipe; **13** – cylinder head cover; **14** – oil level dipstick; **15** – thermostat housing; **16** – cylinder head;**17** – coolant pump pipe; **18** – low oil pressure warning switch; **19** – service plug; **20** – flywheel; **21** – engine block; **22** – oil pan; **23** – oil filter

The K4M engine is gasoline, four-stroke, four-cylinder, inline, sixteen-valve, with dual overhead camshafts. Cylinder firing order: 1–3–4–2, counted from the flywheel. The fuel system is multi-point fuel injection (emission standard Euro 4). The engine, together with the gearbox and clutch, forms the power unit — a single block mounted in the engine compartment on three resilient rubber-metal mounts. The right mount is attached to a bracket on the upper timing-belt cover, while the left and rear ones are attached to the gearbox housing. The engine block is cast iron, with cylinders bored directly into the block. At the front of the engine (in the direction of vehicle travel) are located: the intake manifold; oil filter; oil level gauge; oil pressure sensor insufficient oil pressure; fuel rail with injectors; knock sensor; inlet pipe of the coolant pump; alternator; power steering pump; air conditioner compressor. At the rear of the engine are: air filter housing with idle speed regulator; exhaust manifold with oxygen concentration control sensor; starter.



Power unit (view from the rear in the direction of vehicle travel): **1** – transmission; **2** – starter; **3** – cylinder head; **4** – cylinder head cover; **5** – intake manifold; **6** – throttle assembly; **7** – upper timing belt cover; **8** – upper heat shield of the exhaust manifold;**9** – oxygen concentration control sensor; **10** – lower timing belt cover; **11** – engine block; **12** – accessory drive belt; **13** – exhaust manifold; **14** – oil drain plug of the oil pan; **15** – vehicle speed sensor

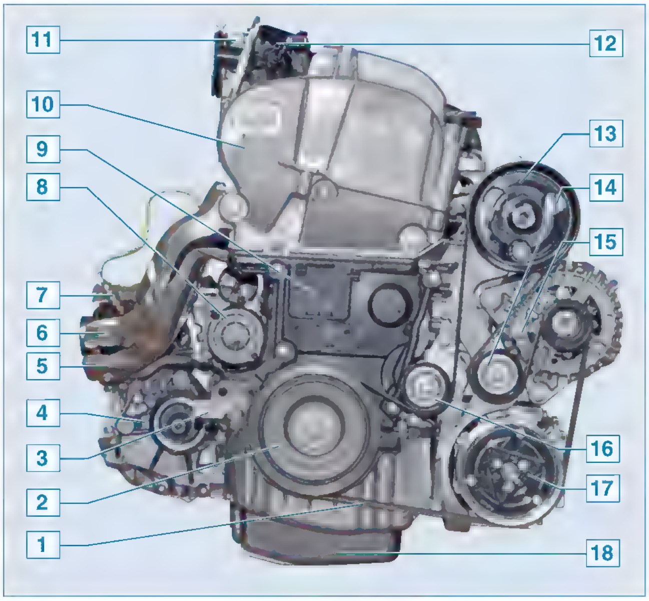
On the right – coolant pump; timing mechanism and coolant pump drive (toothed belt); auxiliary drive (poly-V belt).

On the left are: flywheel; crankshaft position sensor; thermostat; thermostat housing with coolant temperature sensor. On top – ignition coils and spark plugs; oil filler neck; intake manifold with absolute pressure and intake air temperature sensors, throttle assembly with throttle position sensor.

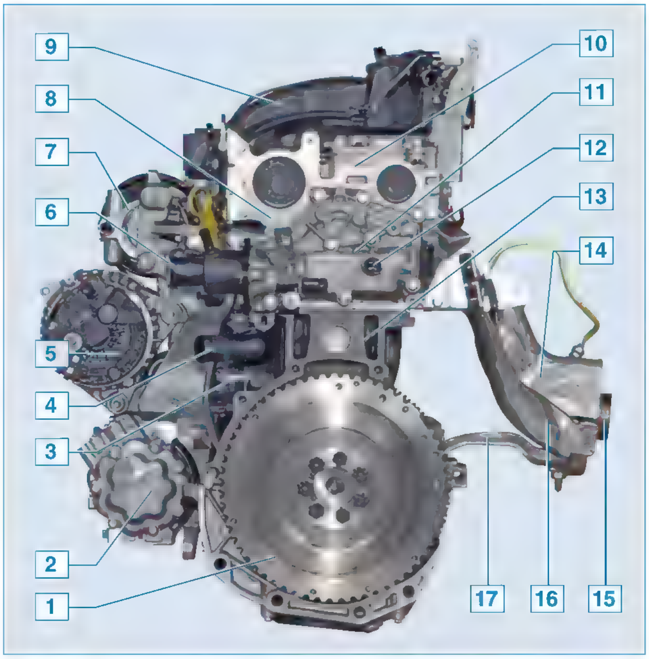
At the bottom of the cylinder block there are five main bearing supports for the crankshaft with removable caps that are fastened to the block with special bolts. The holes in the cylinder block for the bearings are machined with the caps installed, so the caps are not interchangeable and are marked on their outer surface for identification (the cap count is taken from the flywheel side). On the end faces of the center support there are recesses for thrust half-rings that prevent axial movement of the crankshaft. The shells of the main and connecting-rod bearings of the crankshaft are steel, thin-walled, with an antifriction coating applied to the bearing working surfaces. The crankshaft has five main and four rod journals. The shaft is equipped with four counterweights cast integrally with the shaft. For oil supply to the Channels are made from the main bearing journals to the crankpin journals and to the crankshaft cheeks. On the front end (snout) of the crankshaft are mounted: the sprocket driving the oil pump, the toothed pulley driving the valve timing mechanism (VTM), and the pulley driving the auxiliary units. The toothed pulley is secured on the shaft by a projection that fits into a slot on the crankshaft snout. The pulley driving the auxiliary units is fixed on the shaft in the same way.

The crankshaft is sealed with two oil seals, one of which (on the timing drive side) is pressed into the cylinder block cover, and the other (on the flywheel side) is pressed into the recess formed by the surfaces of the cylinder block and the main bearing cap. The flywheel is attached to the crankshaft flange with seven bolts. It is cast from cast iron and has a press-fit steel ring gear for starting the engine with the starter. In addition, the flywheel has a toothed ring for the crankshaft position sensor.

The connecting rods are forged steel, I-beam section, machined together with their caps. The caps are fastened to the rods with special bolts and nuts. The rods' lower (crank) ends are connected to the crankshaft crankpins through bearings, and their upper ends are connected to the pistons via wrist pins. The wrist pins are steel and tubular. The pin pressed into the rod small end rotates freely in the piston bosses. The pistons are made of an aluminum alloy. The piston skirt has a complex shape: in longitudinal section it is barrel-shaped—



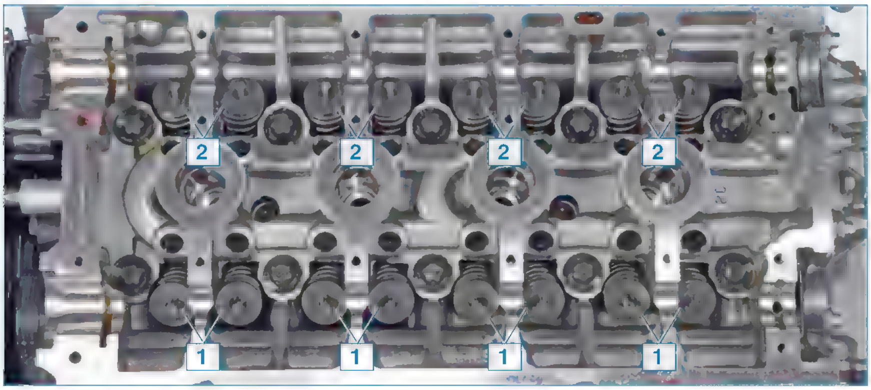
Power unit (view from the right in the direction of vehicle travel): 1 – auxiliary drive belt;**2** – auxiliary drive pulley; **3** – cylinder block; **4** – gearbox; **5** – lower heat shield of the exhaust manifold; **6** – upper heat shield of the exhaust manifold; **7** – oxygen concentration control sensor; **8** – starter; **9** – lower cover of the timing belt; **10** – upper cover of the timing belt; **11** – throttle assembly; **12** – intake manifold (receiver); **13** – power steering pump pulley; **14** – belt idler; **15** – alternator; **16** – belt tensioner pulley; **17** – air conditioning compressor pulley; **18** – oil sump



Engine (view from the left in the direction of travel): 1 – flywheel; **2** – air conditioner compressor; **3** – oil filter; **4** – coolant pump inlet pipe;**5** – alternator; **6** – thermostat housing; **7** – power steering pump; **8** – cylinder head; **9** – receiver;**10** – cylinder head cover; **11** – cylinder head cooling jacket cover; **12** – coolant temperature sensor; **13** – engine block; **14** – upper heat shield of the exhaust manifold; **15** – exhaust manifold; **16** – lower heat shield of the exhaust manifold; **17** – exhaust manifold bracket

varied, while in the transverse direction it is oval. Three grooves for piston rings are machined in the upper part of the piston. The two upper piston rings are compression rings, and the lower one is an oil ring. The cylinder head is cast from an aluminum alloy and is common to all four cylinders.

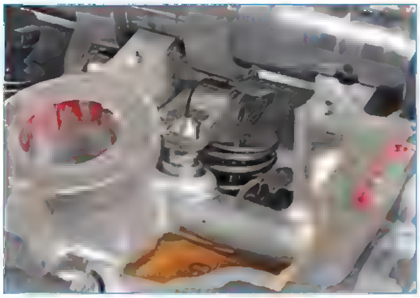
The cylinder head is centered on the block by two bushings and secured with ten bolts. A non-shrinking metal gasket is installed between the block and the head. On opposite sides of the cylinder head are located on the intake and exhaust ports. The spark plugs are installed at the center of each combustion chamber. The valves are steel and arranged in two rows in the cylinder head in a V-formation, two intake and two exhaust valves per cylinder. The intake valve head is larger than the exhaust valve head. The valve seats and guide bushings are pressed into the cylinder head. Oil-deflecting caps are fitted over the valve guide bushings from above. The valve is closed by a spring. Its lower end rests on a washer and its upper end on a retainer plate held in place by two locks. The assembled locks are conical on the outside and have thrust flanges on the inside that engage the groove on the valve stem. In the upper part of the



Cylinder head: 1 – intake valves; **2** – exhaust valves

Two camshafts are installed in the cylinder head. One shaft operates the intake valves of the valve train, and the other operates the exhaust valves. Each shaft has eight cam lobes—a neighboring pair of lobes simultaneously actuates the valves (intake or exhaust) for each cylinder. A distinctive feature of the camshaft design is that the lobes are pressed onto a hollow shaft.

The camshaft bearings (six supports for each shaft) are split—located in the cylinder head and the head cover. The camshafts are driven by a toothed belt from the crankshaft pulley. Near the first bearing journal (counting from the camshaft timing pulley) a thrust flange is machined on the shaft; during assembly it fits into recesses in the cylinder head and cover, thereby preventing axial movement of the shaft. The camshaft pulley is not secured to the shaft by a key or pin but solely by frictional forces generated on the mating end faces of the pulley and shaft when the pulley nut is tightened. The camshaft nose is sealed by an oil seal fitted onto the first journal and pressed into the bore formed by the surfaces of the cylinder head and head cover. The valves are actuated by the camshaft lobes through the valve levers.

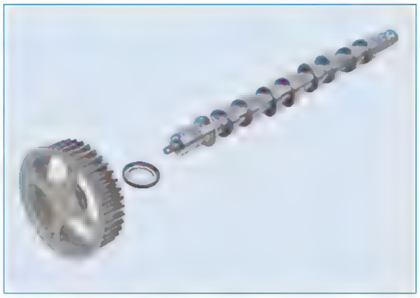


One end of the lever rests on the spherical head of the hydraulic support (hydro-gap compensator), and the other acts on the end of the valve stem

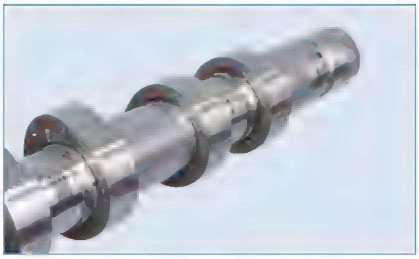
To extend the service life of the camshaft and the valve levers, the cam lobe acts on the lever through a roller that rotates on the lever's pivot.

The hydraulic supports of the valve levers are installed in the recesses of the cylinder head. A hydraulic lifter with a one-way ball valve is installed inside the support body. Oil enters the hydraulic support from the cylinder head gallery through a hole in the support housing. The hydraulic support automatically maintains a zero-clearance contact between the camshaft lobe and the lever roller, compensating for wear of the cam lobe, the lever, the valve stem tip, the seat chamfers, and the valve disc.

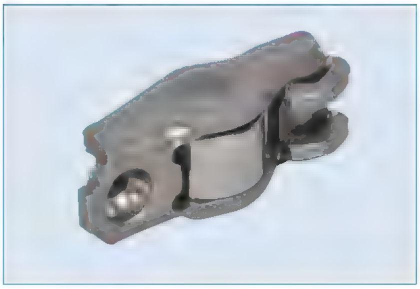
The engine lubrication is combined. Under pressure, oil is supplied to the main and connecting-rod bearings of the crankshaft, to the camshaft bearings, and to the hydraulic supports of the valve levers. Other engine components are lubricated by splashing. Pressure in the lubrication system is generated by a gear oil pump located in the oil pan and attached to the cylinder block. The oil pump is driven by a chain from the crankshaft. The drive sprocket for the pump is installed on the crankshaft under the front cover of the cylinder block. The sprocket has a cylindrical collar that serves as the seating for the front crankshaft oil seal. The sprocket is fitted onto the crankshaft without interference and is not fixed with a key. During engine assembly, the drive sprocket for the pump is clamped between the timing drive toothed pulley and the crankshaft flange when the bolt securing the auxiliary drive pulley is tightened, drawing the component stack together. Torque from the crankshaft is transmitted to the sprocket solely by friction forces between the end faces of the sprocket, the timing pulley, and the crankshaft. If the bolt securing the auxiliary drive pulley is loosened,



Camshaft with toothed pulley and oil seal



Cams pressed onto the camshaft

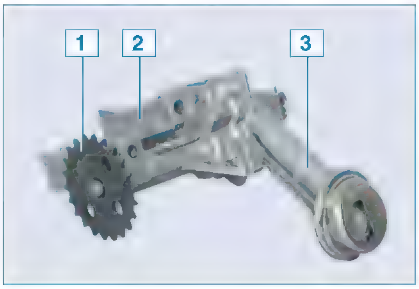


Valve lever

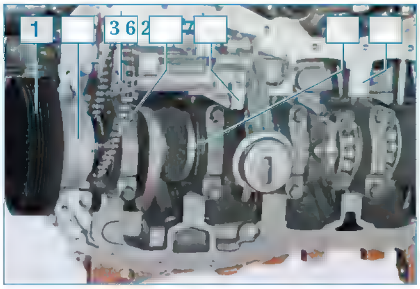
Hydraulic support of the valve lever

If the leading star of the oil pump drive begins to slip on the crankshaft, the engine oil pressure will drop. The oil intake is made as a single piece with the oil pump housing cover. The cover is attached to the pump housing with five screws. The relief valve is located in the pump housing cover and is held in place by a spring retainer. Oil from the pump passes through the oil filter and enters the main oil gallery of the engine block. The oil filter is full-flow and non-serviceable. From the main gallery, oil flows to the main bearings of the crankshaft and then, through passages in the crankshaft, to the connecting-rod bearings. Through two vertical passages in the engine block, oil from the main gallery is supplied to the cylinder head — to the outer (left) supports (bearings) of the camshafts. Through grooves and holes in the outer bearing journals of the camshafts, oil enters the shafts and then, through holes in the other journals, to the remaining camshaft bearings. From the cylinder head, oil drains through vertical passages into the engine oil pan.

The crankcase ventilation system is closed, forced, with gas extraction through an oil separator (in the cylinder head cover), which cleans the crankcase gases of oil particles. Gases from the lower part of the crankcase pass through internal channels in the cylinder head to the head cover and then flow into the receiver and the engine intake manifold. The control, fuel, cooling, and exhaust systems are described in the respective chapters.



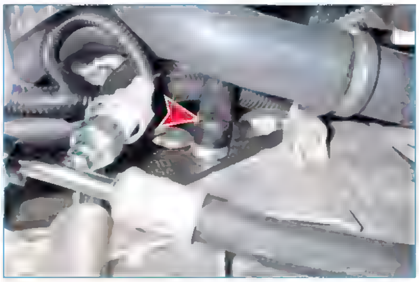
Oil pump: 1 – driven sprocket of the drive; **2** – pump housing; **3** – pump housing cover with oil intake



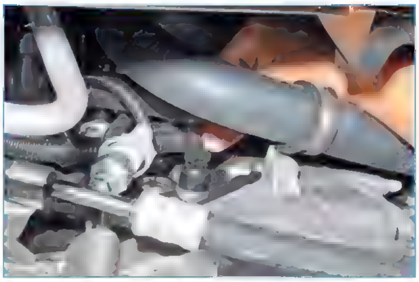
Oil pump drive (oil pan removed): 1 – drive pulley for auxiliary units; **2** – front cover of the cylinder block; **3** – drive sprocket of the pump; **4** – drive chain;**5** – oil pump; **6** – crankshaft; **7** – cylinder block

Replacing the low oil pressure warning sensor

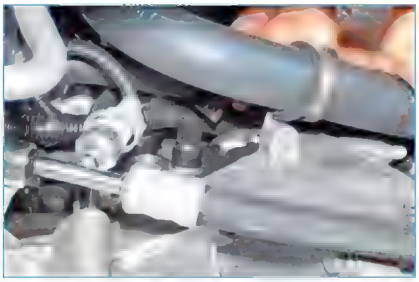
Replace the sensor when it fails. Perform the work over an inspection pit or on a ramp. Remove the powertrain shield (see “Removing the powertrain shield,” p. 283).



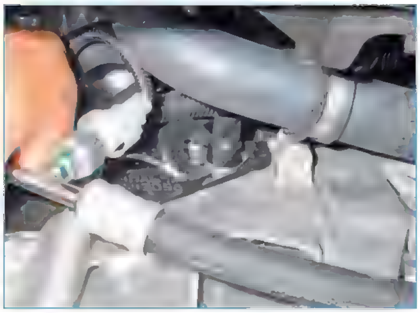
The sensor is screwed into a hole located in the lower part of the front wall of the engine block.



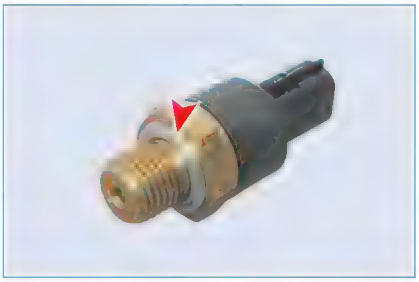
Pressing the wire connector latch...



...disconnect the wire connector from the sensor.



Use a 22 mm wrench to unscrew the sensor from the threaded hole in the engine block.

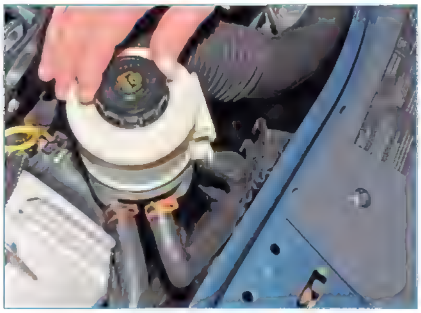


The sensor connection to the cylinder block is sealed with a soft-metal ring.

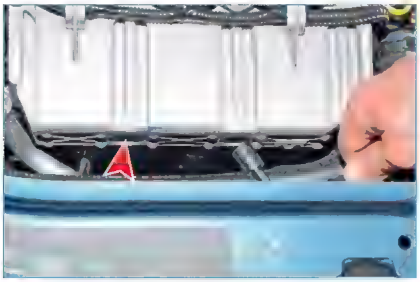
When installing the sensor, screw it into the cylinder block hole by hand and then tighten it using a tool. Connect the wire connector to the sensor.

Removing the fuel rail shield

Remove the fuel rail shield to access the injectors and when removing the cooling system radiator fan. Push the power steering fluid reservoir upward from the upper crossmember bracket of the radiator frame...



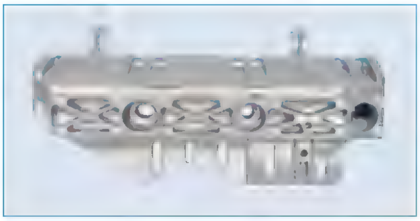
...and lower the reservoir so that the hose connecting the reservoir to the power steering pump sits below the rail shield.



Through the holes in the shield, use a 13 mm socket with an extension to loosen the two nuts on the studs securing the rail shield.

Remove the nuts from the protector wells. Slide the ramp guard forward off the studs of the intake pipe...

...and remove it from the engine compartment.

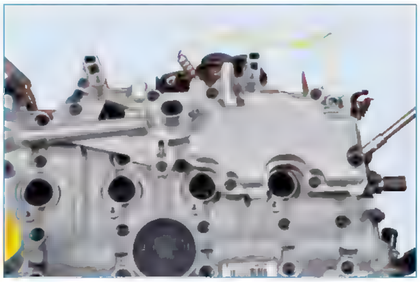


Fuel rail guard

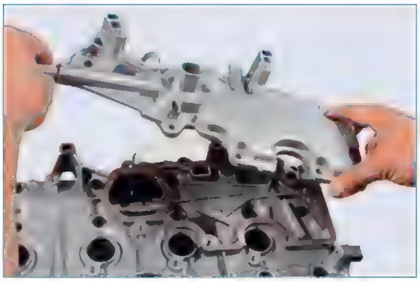
Install the fuel rail protection in the reverse order.

Removing the crankcase ventilation oil separator

Remove the oil separator for cleaning it of deposits and when removing the cylinder head cover. Remove the intake manifold (see " Removing the intake manifold, replacing gaskets," p. 167). For clarity, the procedure is shown on a removed engine.

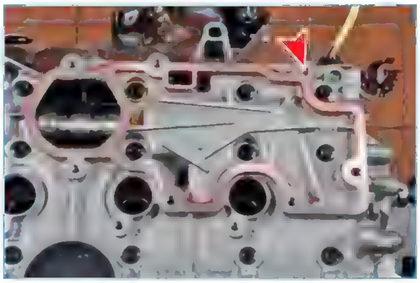


Using an 8 mm socket, unscrew the eight bolts securing the oil separator to the cylinder head cover...



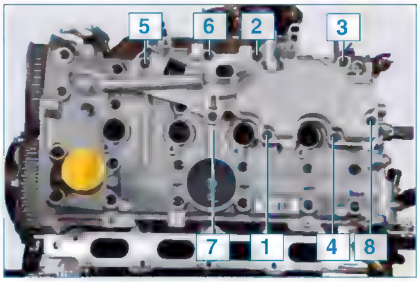
...and remove the oil separator.

Before installation, clean the oil separator and flush its chambers and passages with gasoline to remove deposits.



Remove the remnants of old sealant from the mating surfaces of the oil separator and the cylinder head cover and degrease the surfaces.

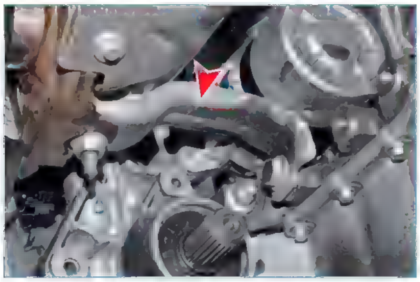
The surfaces must be clean and dry, with no fingerprints remaining. Apply a flange sealant Loctite 518 to the mating surface of the oil separator until the surface takes on a reddish tint. Fit the oil separator and tighten its mounting bolts in the specified sequence to the prescribed torque (see "Appendices," p. 315).



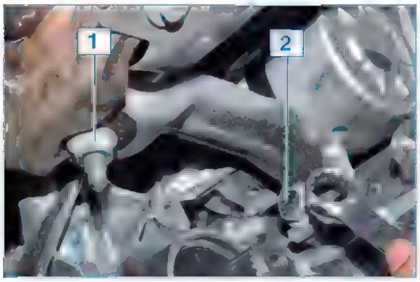
Torque tightening sequence for the oil separator mounting bolts. Continue reassembly in reverse order.

Removing the exhaust manifold

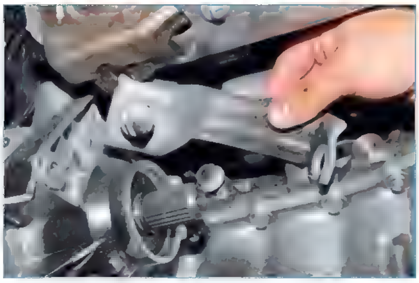
Remove the exhaust manifold for replacement, to replace the manifold gasket, or when repairing the cylinder head. Perform the work on a service pit on a pit or an overpass. Remove the engine guard (see "Removing the engine guard," p. 283). Disconnect the exhaust system's front pipe from the exhaust manifold (see "Removing the exhaust system," p. 180).



From below, the exhaust manifold is supported by a bracket attached to the engine block (the right wheel has been removed for clarity).



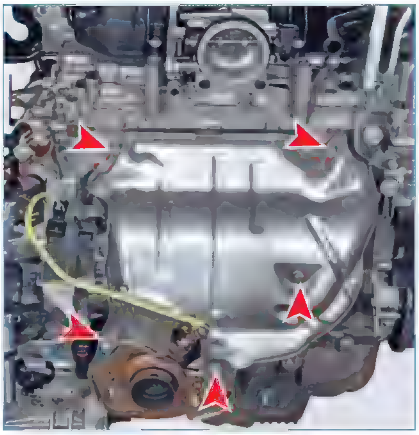
Using an open-end wrench or a 16 mm socket, loosen nut 1 fastening the bracket to the manifold several turns and bolt 2 fastening the bracket to the engine block.



Remove the manifold mounting bracket.

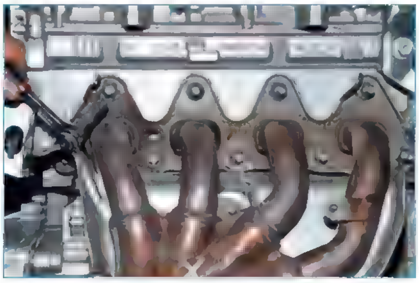
Remove the air filter housing (see “Removing the air filter housing,” p. 166). For clarity, the following operations are shown on the removed engine.

Use a 10 mm socket to loosen the five bolts securing the collector's upper heat shield.



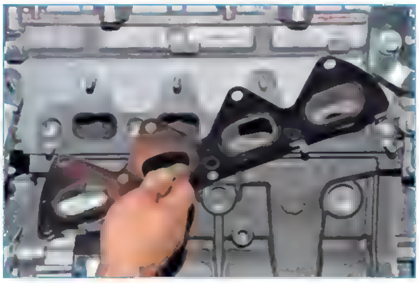
Location of the bolts securing the upper heat shield of the manifold.

Remove the oxygen concentration control sensor (see “Removing oxygen concentration sensors,” p. 159). Before loosening the manifold mounting nuts, moisten the threaded connections of the nuts and studs with a penetrating fluid such as WD-400.

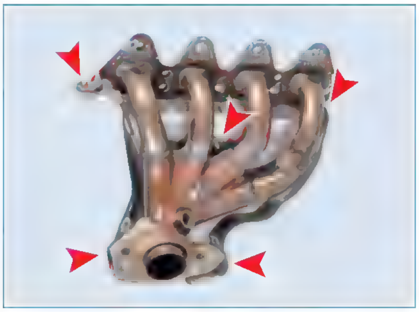


Using a 10 mm socket on an extension, loosen the nine nuts securing the exhaust manifold to the cylinder head studs...

...and remove the manifold assembly with the lower heat shield.



Remove the exhaust manifold gasket from the cylinder head studs.



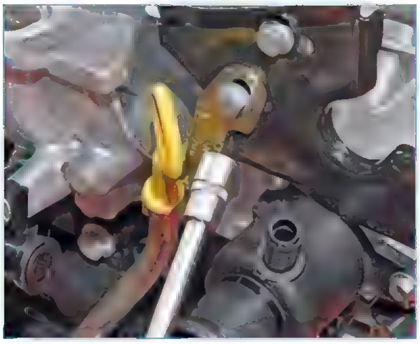
If necessary, use a 10 mm wrench to loosen the five bolts securing the lower heat shield to the exhaust manifold...

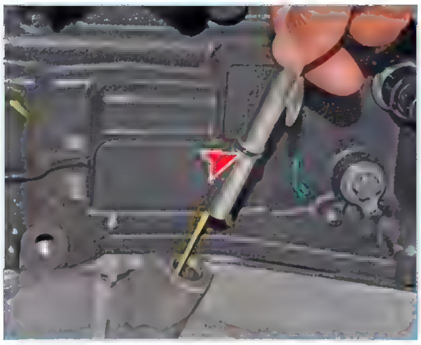
...and separate the manifold and the shield. Before installing the exhaust manifold, clean the mating surfaces of the cylinder head and manifold from carbon deposits. After installing a new gasket, reassemble in reverse order. Before tightening the manifold mounting nuts onto the cylinder head studs, apply graphite lubricant. The mounting nuts of the

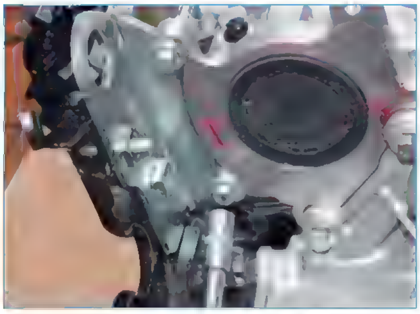
Tighten the intake manifold evenly (moving from the center toward the edges) to the specified torque (see “Appendices”, p. 315).

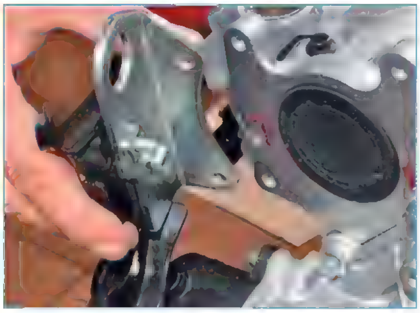
Removal of camshafts, replacement of hydraulic valve lifters

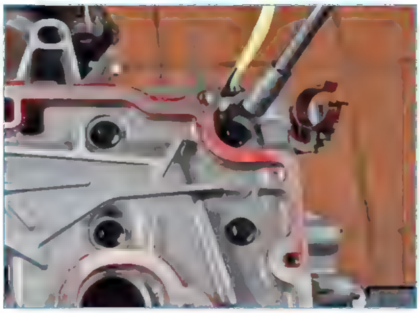
Remove the camshafts for replacement when the cam lobes and bearing journals are significantly worn, and also when replacing the valve levers valves and their hydraulic supports, valve stem oil seals, and also when repairing the cylinder head. The condition of the cam lobes of the camshafts and the hydraulic supports of the valve levers should be assessed when a characteristic ticking in the valve mechanism appears during engine operation. Perform the work in an inspection pit or on a ramp. Remove the timing belt (see “ Inspection and replacement of the timing belt of the 1.6 (16V) engine”, p. 42). Remove the crankcase ventilation oil separator (see “ Removal of the crankcase ventilation oil separator”, p. 139). For clarity, the operations are shown on a removed engine.

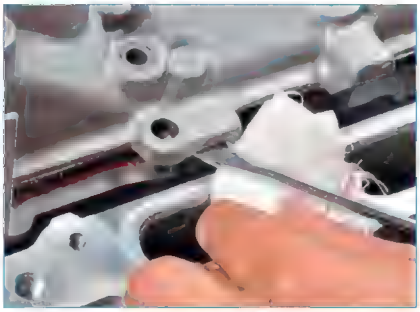

Using a 10 mm socket, unscrew the bolt that secures the bracket of the oil level indicator guide tube to the air intake bracket.

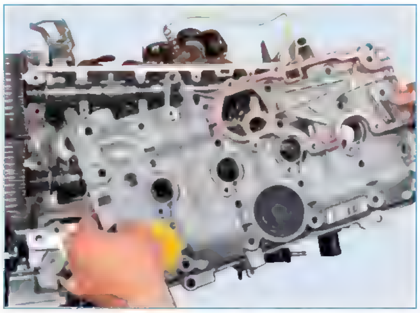

Remove the dipstick guide tube from the oil pan housing. The guide tube is sealed in the oil pan housing by a rubber O-ring.

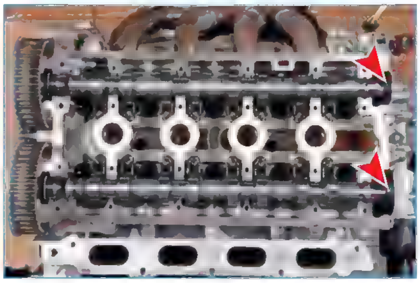

Using an 8 mm socket, unscrew the two bolts securing the eye bolt...


...and remove the eye bolt with the air intake bracket.

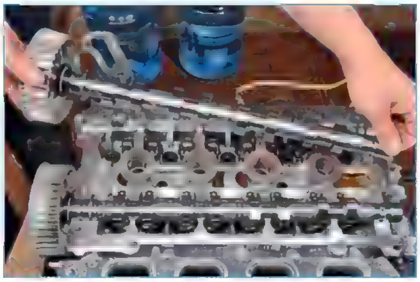

Using an 8 mm socket, loosen the twenty-four bolts securing the cylinder head cover.

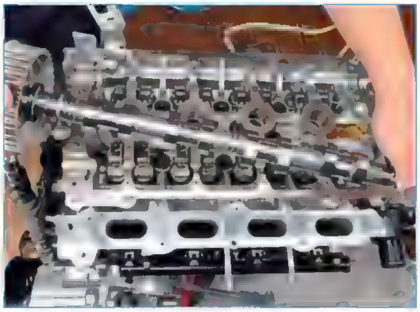

Using a flathead screwdriver as a lever, pry the cylinder head cover off by its ribs. Rest the screwdriver against the surface of the intake manifold, placing a rag under the screwdriver shaft.

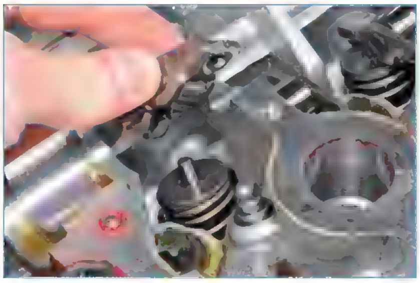

Remove the cylinder head cover.


Remove the two rubber-metal plugs from the cylinder head.

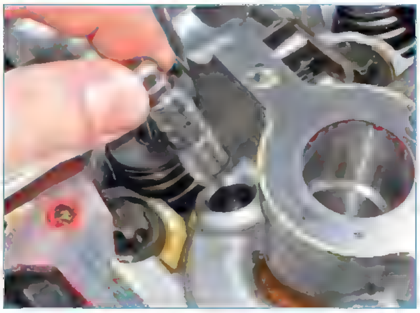
Remove from the cylinder head bearings...


...exhaust valve shaft...


...and the exhaust valve shaft. To assess the condition of the hydraulic support of the valve rocker...

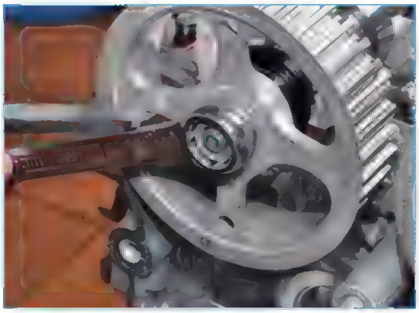


...remove the lever...

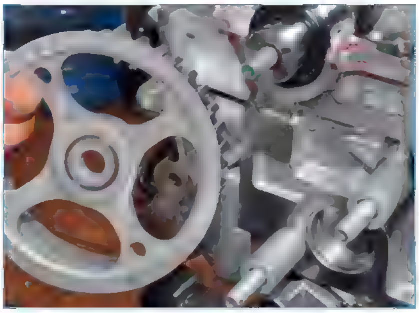


...and pull the hydraulic lifter out of the cylinder head bore.

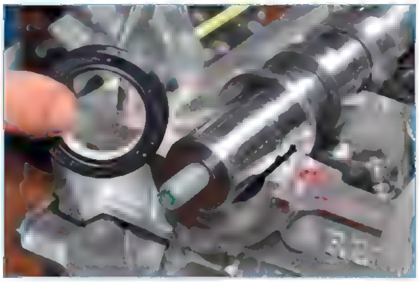
To check the condition of the hydraulic lash adjuster, hold it by the body and press the spherical head of the plunger with your thumb. When functioning properly, the plunger of the hydraulic lash adjuster should depress with considerable effort. If the plunger moves easily, the hydraulic lash adjuster is faulty and should be replaced. Before installing a new hydraulic lash adjuster, immerse it in a container of engine oil and press the plunger several times until no more air bubbles appear. The hydraulic lash adjuster should stop springing and become firm. Similarly, remove the levers and check the condition of the hydraulic lash adjusters on the levers of the other valves. At the same time, mark the positions of the parts in the cylinder head so that they can be reinstalled in their original locations during assembly. When assembling the valve timing mechanism, the camshaft seals must be replaced. To remove the pulley, lay the shaft in the beds of the cylinder head. Fit an 18 mm box wrench onto the nut securing the camshaft timing pulley and insert a heavy screwdriver through the hole in the pulley.



Resting the screwdriver blade on a spoke of the pulley, press the screwdriver shaft against the wrench and turn it counterclockwise. The pulley and camshaft must not rotate while the pulley retaining nut is being loosened.

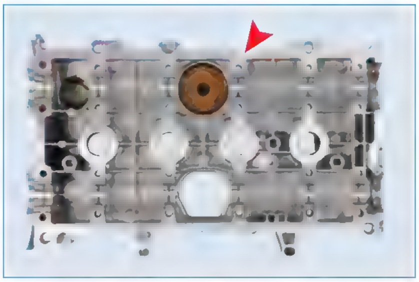


After loosening the nut, remove the pulley from the camshaft snout...



...and remove the oil seal.

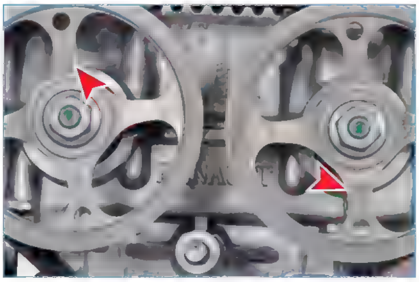
Similarly, remove the oil seal from the other camshaft. With the hydraulic supports and valve levers installed, place the camshafts into the cylinder head bearings. Before installing the cylinder head cover, clean the mating surfaces of the cover and the cylinder head of any remaining old sealant. The surfaces must be clean and dry, with no fingerprints left on them.



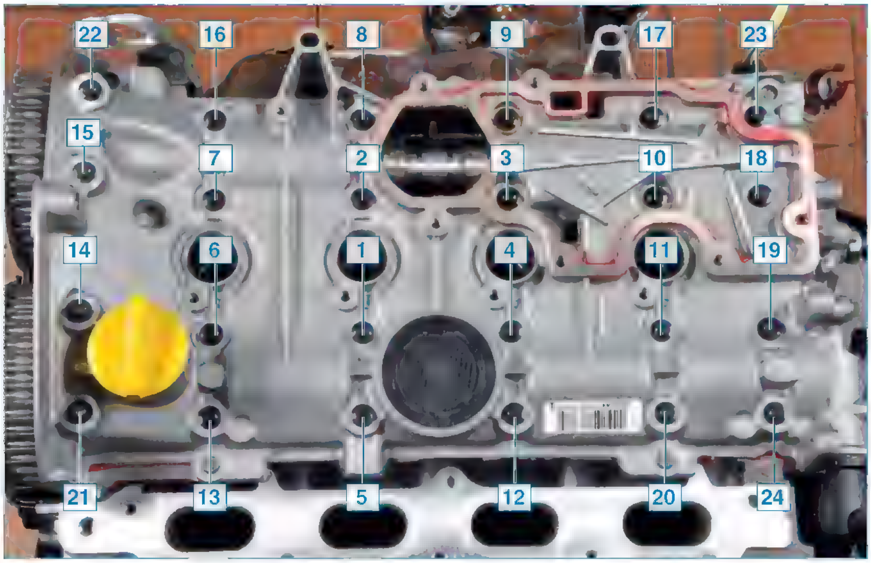
Apply the special flange sealant Loctite 518 to the mating surface of the cylinder head cover until the surface turns reddish.

Install the cylinder head cover and tighten its mounting bolts to the specified torque in the sequence shown in the table (see p. 143).

With the cylinder head cover in place, use the tool head or a suitably sized section of pipe to press the new camshaft oil seals into the cylinder head bores, first applying a thin layer of engine oil to the working lips of the seals. After checking the timing mechanism settings and locking the shafts (see “Checking condition and replacing the timing belt of the 1.6 (16V) engine”, p. 42), fit the toothed pulleys onto the camshaft snouts so that the Renault emblems on the pulley spokes are positioned vertically up (exhaust camshaft) and down (intake camshaft). Screw on the pulley retaining nuts by hand, then tighten them lightly.



Placement emblem Renault
on the
pulleys.



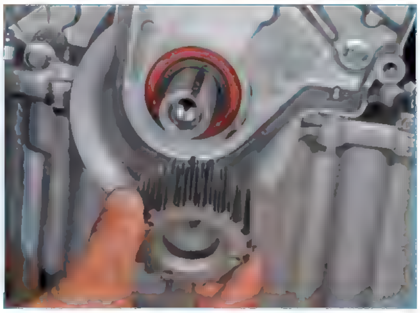
Bolt numbering for the cylinder head cover

Step No	Tightening sequence bolts	Bolt loosening order—of bolts	Tightening torque, N·m
1	22–23–20–13		8,0
2	from 1 to 12 from 14 to 19 21 and 24		12,0
3		22–23–20–13	–
4	22–23–20–13		12,0

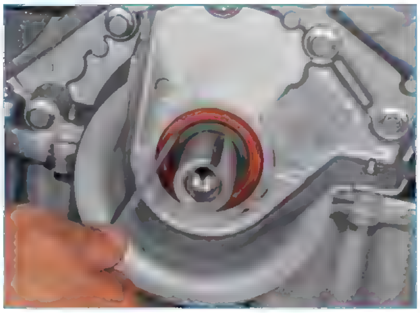
Place the timing belt onto the pulleys and tension it (see “ Checking condition and replacing the timing belt of the 1.6 (16V) engine”, p. 42). Tighten the camshaft pulley mounting nuts to the specified torque (see “ Appendices”, p. 315). Rotate the crankshaft two full turns clockwise and check the timing alignment (see “Checking condition and replacing the timing belt of the 1.6 (16V) engine”, p. 42). If necessary, repeat the timing alignment. Reassemble in the reverse order of disassembly.

Front crankshaft oil seal replacement

Replace the front crankshaft oil seal when you see signs of oil leakage on the oil pan wall beneath the drive pulley for the auxiliary units. Perform the work in an inspection pit or on a ramp. Remove the timing belt (see “ Checking the condition and replacing the timing belt of the 1.6 (16V) engine,” p. 42). After removing the belt, do not rotate the crankshaft or camshaft so as not to disturb the engine’s valve timing. For clarity, the procedure is shown on a removed engine. Using a slotted screwdriver, pry off the toothed crankshaft pulley...



...remove the pulley from the crankshaft snout.

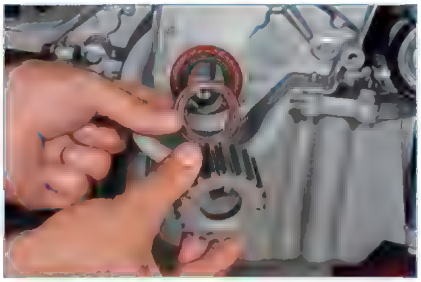


Pry the oil seal out with a screwdriver...

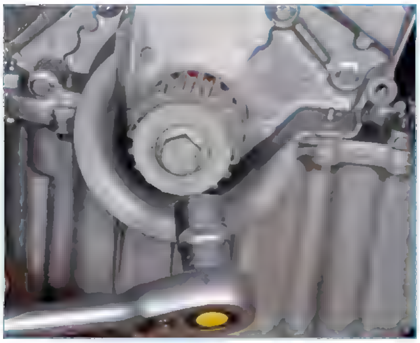
...withdraw it from the mounting seat in the front cover of the cylinder block.

Apply a thin layer of engine oil to the working edge of the new seal, and press the seal into the bore using a suitable tool head or a section of pipe of the appropriate size. The new seal must be pressed in to the same depth as the old seal was (the seal should be slightly recessed in the cover).

For a more precise seating of the oil seal in the cover...

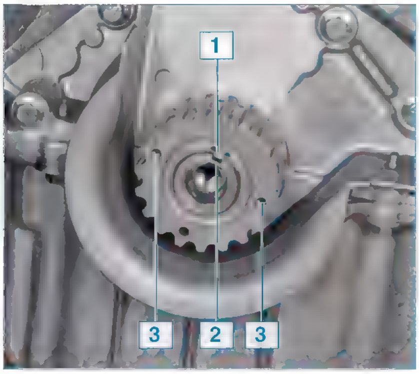


...it can be press-fitted using the old oil seal and a toothed pulley...



...while tightening the bolt securing the pulley of the auxiliary drive.

We assemble the timing drive in reverse order. When installing the toothed pulley...



...its projection 1 (acting as a key) must fit into groove 2 on the crankshaft snout, and the threaded holes 3 on the pulley flange must face outward.

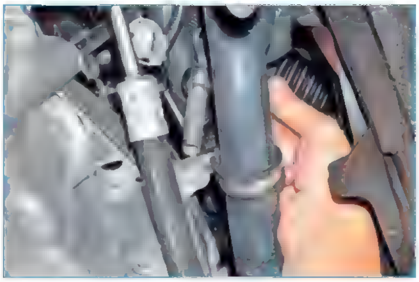
Install the timing belt of the timing drive (see “Inspection and replacement of the timing drive belt for the 1.6 (16V) engine”, p. 42).

Replacement of the rear crankshaft oil seal

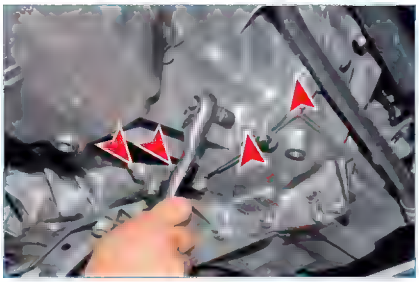
The procedures for replacing the rear crankshaft oil seal on the 1.6 (16V) engine are the same as those for replacing the rear crankshaft oil seal on the 1.4–1.6 (8V) engine — see “Replacing the Rear Crankshaft Oil Seal,” p. 93).

Replacement of the oil pan gasket

We replace the oil pan gasket if oil leaks at the joint between the pan and the engine block, and also whenever the pan is removed during engine repairs. The work is carried out in an inspection pit or on a ramp. The procedures are shown on a vehicle equipped with air conditioning. Remove the powertrain protection (see “Removing the Powertrain Protection,” p. 283). Drain the engine oil (see “Engine Oil and Oil Filter Change for 1.6 (16V),” p. 39). Remove the right engine compartment splash shield (see “Removing Engine Compartment Splash Shields,” p. 283). Remove the rear engine mount (see “Replacing Engine Mounts,” p. 96). From beneath the vehicle, at the front of the engine...

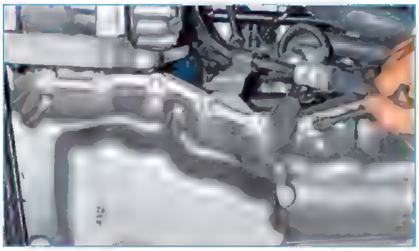


...using a 10 mm socket, loosen the bolt securing the bracket of the radiator return hose to the oil pan.

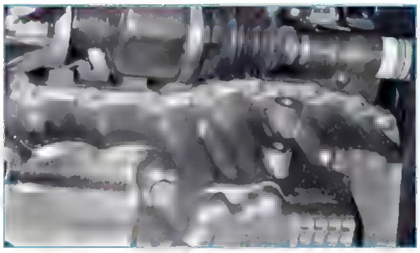


Using a 13 mm socket, loosen the four bolts securing the oil pan to the transmission.

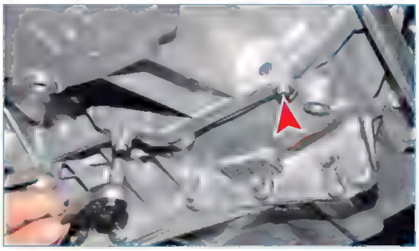
Using a 10 mm socket, loosen twenty bolts securing the oil pan to the engine block, of which...



...nine front bolts...

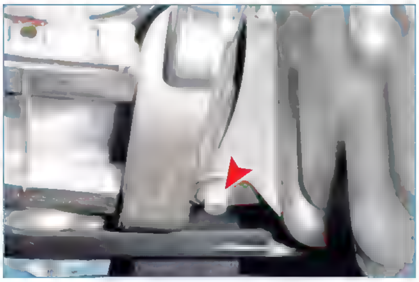


...nine bolts of the rear mounting...



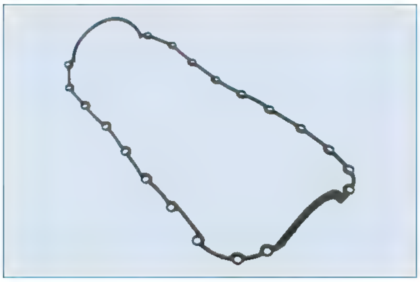
...and two bolts of the left mounting.

The two bolts of the left oil pan mounting are long.

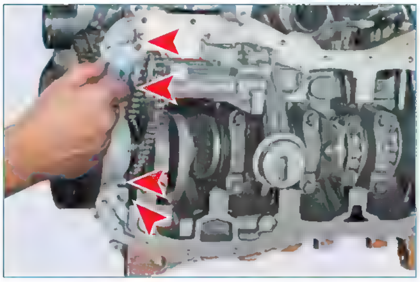


Using a 13 mm socket, loosen the bolt securing the air conditioning compressor bracket to the oil pan.

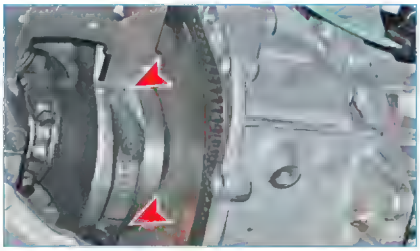
Remove the guide tube of the oil level dipstick (see “Removing the camshafts, replacing the hydraulic valve lifters,” p. 140). Unscrew the three screws securing the front bumper to the subframe (see “Removing the front bumper on a Logan,” p. 286). Turn the rear subframe mounting bolts out 3–4 turns (see “Removing the subframe,” p. 204). After loosening the bolts that secure the two subframe brackets to the body (see “Removing the control arm,” p. 203) and the bolts of the front subframe mounting to the body (see “Removing the subframe,” p. 204), lower the front of the subframe onto an adjustable stand. Pulling the subframe down, remove the oil pan and withdraw it from behind the subframe.



We remove the sealing gasket from the oil pan grooves. We clean the mating surfaces of the cylinder block and the oil pan of any remaining sealant and oil. We wash the inner surface of the oil pan with kerosene. We place a new gasket into the oil pan grooves. Before fitting the oil pan, we apply a thin layer of sealant...



...in four places on the front cover of the cylinder block (shown on the removed engine for clarity)



...and in two places on the cap of the first main

main crankshaft bearing. Install the oil pan and start threading its mounting bolts

to the cylinder block. Tighten the oil pan mounting bolts in a crisscross pattern from the center outward to the specified torque (see “Appendices,” p. 315).

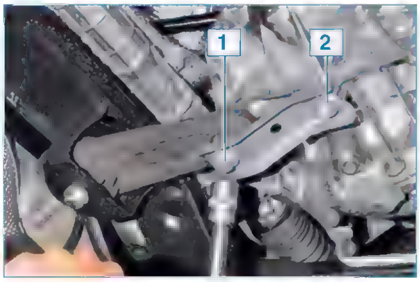
Removing the oil pump

The procedure for removing the oil pump on the 1.6 (16V) engine is similar to that for the 1.4–1.6 (8V) engines — see “Removing the Oil Pump,” p. 95).

Replacing the powertrain mounts

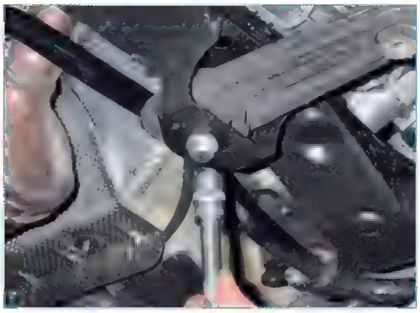
We replace mounts when the rubber block of the mount is torn or has separated from the metal parts, which can cause knocking during engine startup and when driving over bumps. We perform the work in an inspection pit or on a service ramp.

Rear mount replacement

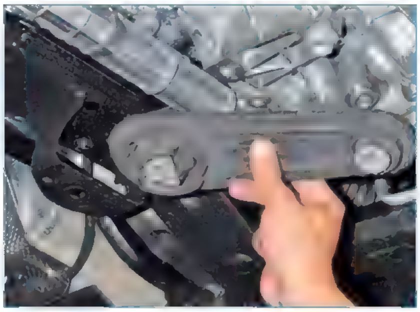


Using an 18 mm socket, unscrew bolt 1 and loosen the tightening of bolt 2 holding the bracket— of the mount and the mount bracket to the gearbox housing.

Remove the support bracket.



Using an 18 mm socket, unscrew the bolt securing the mount to the subframe...

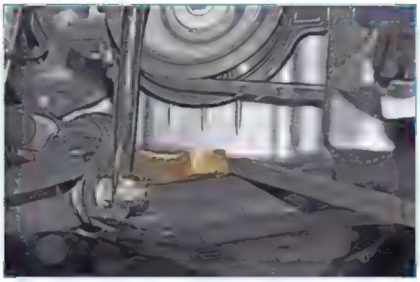


...and remove the mount.

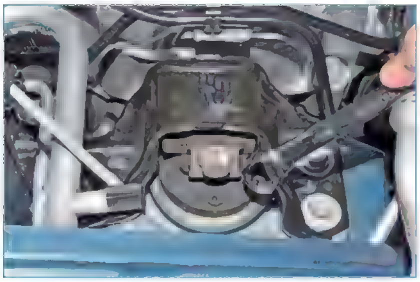
Rear engine mount Install the rear engine mount in reverse order. Tighten the mount mounting bolts to the specified torque (see "Appendices", p. 315).

Right engine mount replacement

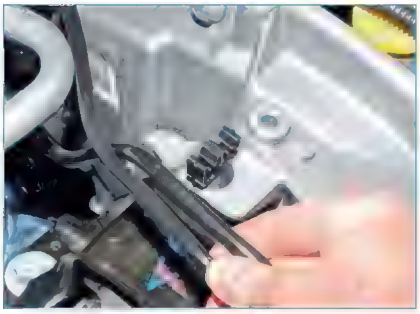
Remove the powertrain shield (see “Removing the powertrain shield,” p. 283). Place an adjustable support (for example, a jack) under the oil pan through a wooden block. Without using the adjustable support, you can slightly lift the right side of the engine with a pry bar (by prying under the oil pan, resting the bar on the subframe)...



...and insert a wooden wedge between the subframe and the oil pan.

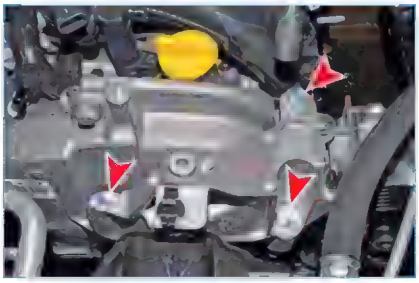


Use an 18 mm box wrench to loosen the bolt that secures the mount to its bracket.

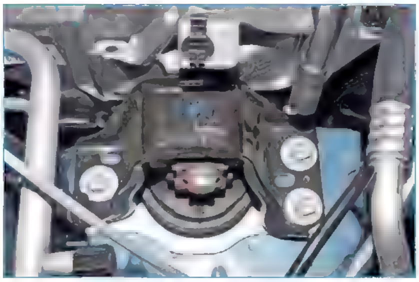


Remove from the two retainers located on the mount bracket, the fuel supply pipe to the rail, the fuel vapor return pipe from the adsorber, and the wiring harness.

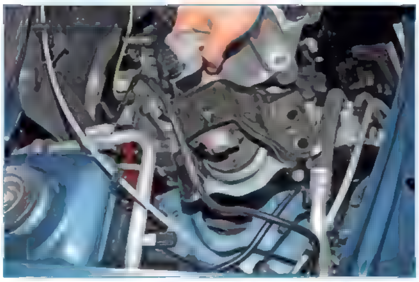
Using a 16 mm socket, loosen...



...the three bolts securing the bracket of the support to the timing drive upper cover...

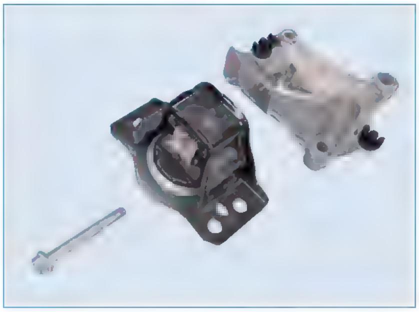


...and the three bolts fastening the support to the body.



Remove the right engine assembly support together with the bracket.

After loosening the bolt that fastens the support to its bracket...

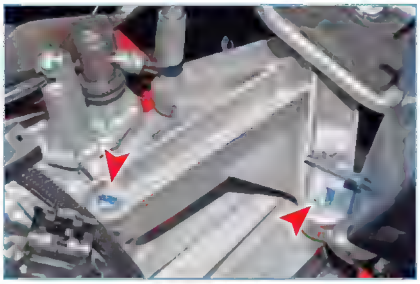


...disconnect the support and the bracket.

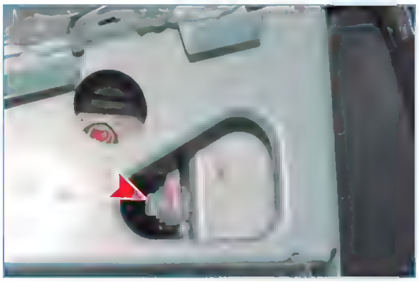
Install the right mount of the power unit in reverse order. Tighten the mount retaining bolts to the specified torque (see “Appendices”, p. 315).

Replacing the left mount

Remove the battery (see “Removing the battery,” p. 248). Remove the power unit shield (see “Removing the power unit shield,” p. 283). Support the gearbox oil pan from below with an adjustable support through a wooden block (for example, a jack).

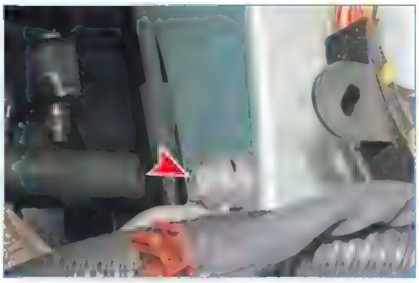


Using a 16 mm socket, loosen the three bolts securing the mount bracket to the gearbox.



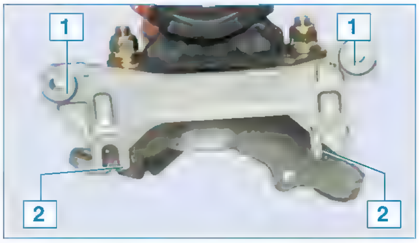
Under the battery shelf, use a 13 mm socket with a long extension to loosen the front

bolt of the upper bracket attachment of the mount to the longitudinal member.



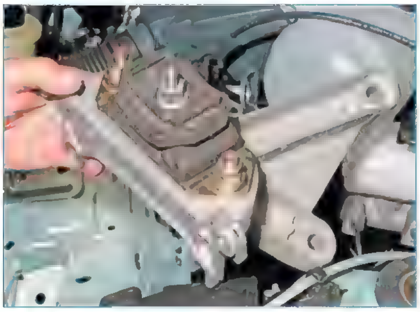
Using a 13 mm socket, loosen the rear bolt of the upper bracket attachment of the mount to the longitudinal member, located

ложенный за полкой аккумулятор-ной батареи. Under the battery shelf, use a 13mm socket with a long extension to unscrew it 2–3 turns



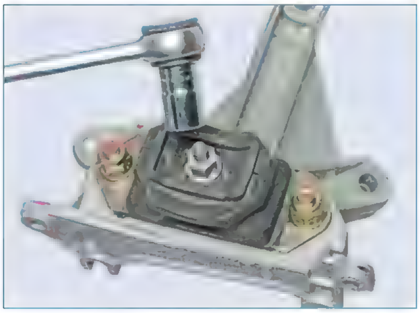
Location of the bracket mounting holes to the side member (shown on the removed support): 1 — upper mounting holes; **2** — lower mounting holes

two bolts of the lower mounting of the bracket to the longitudinal member.

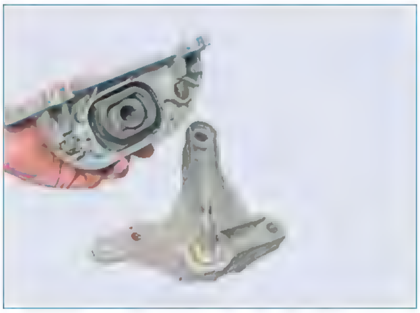


Remove the left power mount assembly.

If necessary...



...use a 16 mm socket to loosen the nut securing the mount to the bracket...



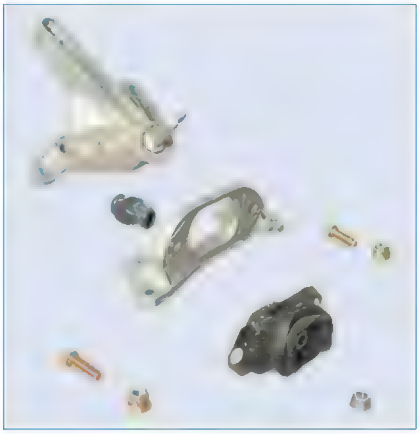
...and remove the mount from the bracket.

Remove the rubber insert from the mount.

By turning the 18mm socket to loosen two nuts...

...remove the support cushion.

Install the left engine mount in the reverse order. Tighten the mount's bolts and nuts to the specified torques (see “Appendices”, p. 315).



Details of the left engine mount

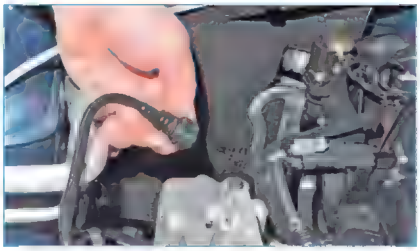
Removal and installation of the engine or the power unit

We perform this work when engine repair or replacement is required. If the work is carried out over an inspection pit or on a ramp, it is better to remove the engine upward from the engine compartment using a lifting device, after first removing the gearbox.

In a garage equipped with a hoist, it is more convenient to lower the entire power unit out of the engine bay and then separate the engine and the gearbox.

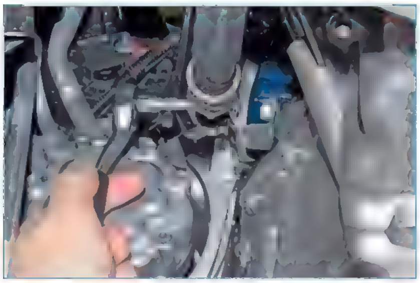
The procedures for removing the engine and powertrain are described for a vehicle equipped with power steering and air conditioning.

Remove the battery (see “Battery removal,” p. 248). Drain the engine oil (see “Engine oil and oil filter change 1.6 (16V),” p. 39) and the coolant (see “Engine coolant replacement 1.6 (16V),” p. 46). Remove the air filter housing (see “ Air filter housing removal,” p. 166). Disconnect the intake pipe of the exhaust system from the exhaust manifold (see “Exhaust system removal,” p. 180). Remove the fuel rail cover (see “Fuel rail cover removal,” p. 139). Disconnect the fuel hose end from the fuel rail fitting (see “Fuel rail and injectors removal,” p. 164). Disconnect the throttle cable from the throttle lever and the intake manifold (see “Throttle cable replacement,” p. 169). Disconnect the vacuum booster check valve hose from the intake manifold fitting (see “Brake booster check valve removal,” p. 231).



Squeezing the two clips, disconnect the adsorber purge tube from the fitting of the engine idle system hose.

Remove the power steering fluid reservoir from the upper crossmember of the radiator frame.



Using a 13 mm socket, unscrew the bolt securing the power steering hose bracket to the engine block.

The engine can be removed either assembled with the power steering pump or without it, without disconnecting the power steering circuit. In the first case, loosen the bolts securing the power steering pump to the engine bracket and, without detaching the pipe and hose from the pump, tie the pump to the upper crossmember of the radiator frame with cord or wire so that it does not interfere with engine removal. In the second case, disconnect the pipe and hose from the pump (see “Removing the power steering pump,” p. 219), draining the working fluid from them into a container.

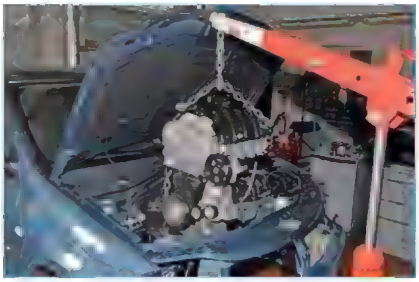
Remove the alternator (see “Removing the alternator, replacing the voltage regulator and rectifier assembly on the 1.6 (16V) engine,” p. 250). Disconnect the wires from the starter (see “Removing and testing the starter,” p. 251). Unscrew the bolts securing the air conditioning compressor to the bracket (see “Removing the air conditioning compressor,” p. 313) and, without disconnecting the air conditioning lines, move the compressor aside and tie it up so it does not obstruct engine removal. Remove the radiator (see “Removing the radiator,” p. 128). Disconnect the cooling system hoses from the thermostat housing and body, as well as from the coolant pump inlet pipe. Disconnect the wiring harness connectors to the engine management wires from the ignition coils, idle speed regulator, fuel injectors, purge solenoid valve and sensors: oxygen concentration, knock, absolute pressure and intake air temperature, low oil pressure warning switch, coolant temperature, crankshaft position, and throttle position (see the relevant chapters: “1.6 (16V) Engine,” “1.6 (16V) Engine Fuel System,” “1.6 (16V) Engine Management System”). Pull the wiring harnesses away from the engine.

If the engine is to be lifted out of the engine bay upward using a hoist, you must first remove the gearbox (see “Removing the gearbox,” p. 189).

Open the hood and hold it in the upright position. Attach the hoist chains to the two lifting eyes located on the engine.

After tightening the chains, remove the support from under the engine that was holding it when the gearbox was removed. Remove the right engine mount (see “Replacing engine mounts,” p. 145).

Before removing the engine, check once more that all hoses, pipes, and wires are disconnected from the engine and moved out of the way.

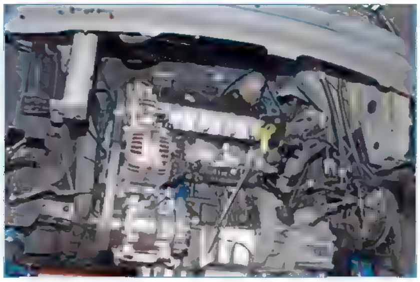


Using the hoist, lift and remove the engine from the engine bay.

If the work is carried out on a hoist and the power unit is removed downward, то генератор демонтировать необязательно – нужно лишь отсоединить от него провода. При демонтаже силового агрегата вместо операций по снятию коробки передач необходимо выполнить следующие работы.

Remove the front wheel drives (see “Removing the front wheel drives,” p. 194) and the subframe (see “Removing the subframe,” p. 204). Disconnect the clutch release cable from the clutch release fork and the bracket on the gearbox (see “Replacing the clutch release cable,” p. 183). Disconnect the gearbox control rod from the shift mechanism shaft (see “Removing the gearbox control rod,” p. 188). Disconnect the ground wires and wiring harness from the gearbox (see “Removing the gearbox,” p. 189). Remove the speed sensor (see “Removing the speed sensor,” p. 110). Disconnect the wiring connector from the reverse light switch (see “Removing the reverse light switch,” p. 261).

Support the engine and gearbox with adjustable stands or a sturdy bench. Remove the right engine mount (see “Replacing the engine mounts,” p. 145). Unscrew the nut securing the left engine mount to the mount bracket (see “Removing the gearbox,” p. 189). By raising the car on a lift or lowering the power unit onto the adjustable supports, withdraw the stud of the left mount bracket from the hole in the mount cushion.

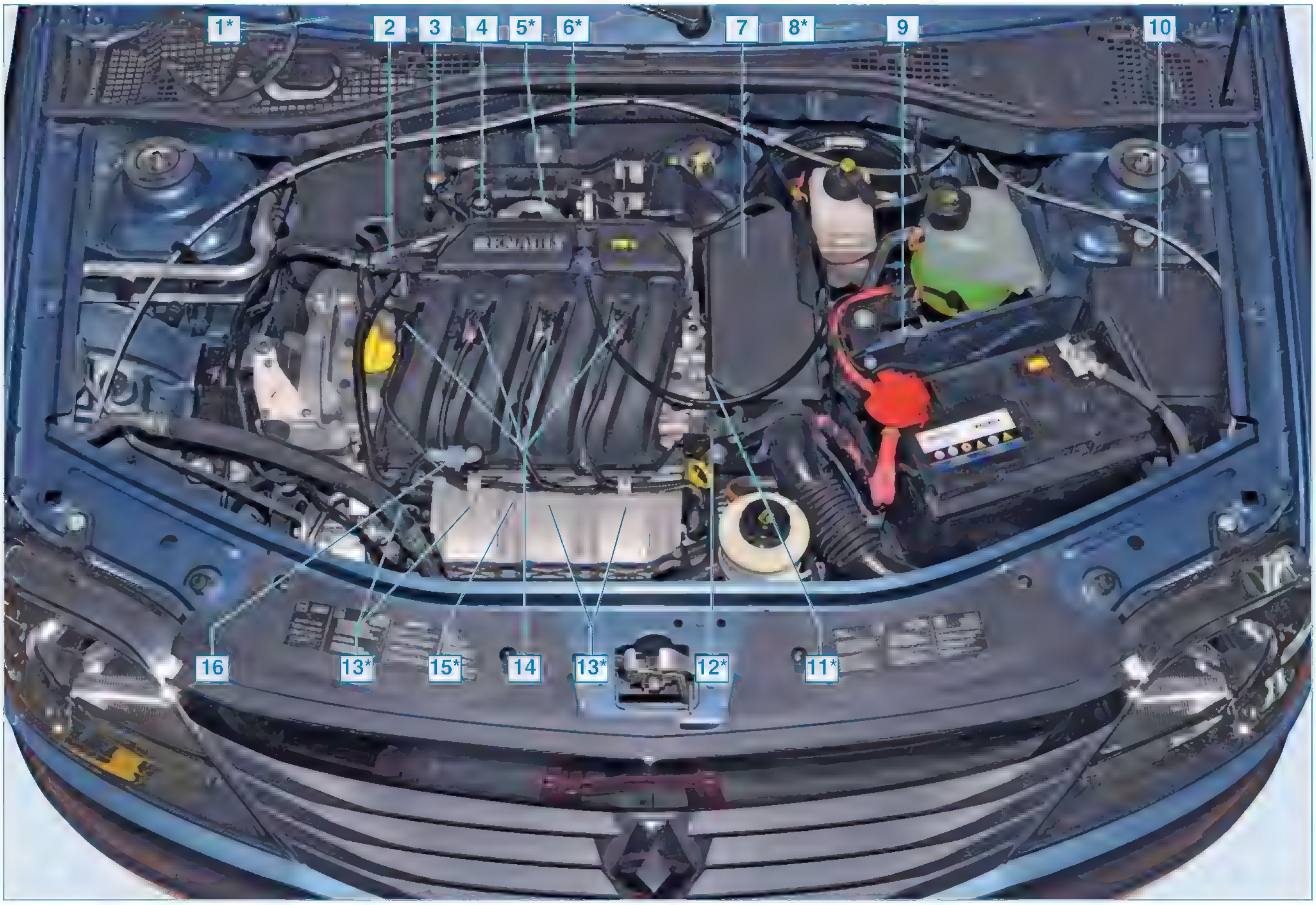


Remove the power unit.

Install the engine or power unit in the vehicle in the reverse order.

Engine management system 1.6 (16V)

Description of construction



Elements of the electronic engine control system (EES): 1* – diagnostic connector; **2** – absolute intake air pressure sensor; **3** – idle speed regulator; **4** – throttle position sensor; **5*** – control oxygen concentration sensor; **6*** – diagnostic oxygen concentration sensor; **7** – vehicle speed sensor; **8*** – engine management system malfunction indicator; **9** – electronic engine control unit; **10** – fuse and relay box in the engine compartment; **11*** – coolant temperature sensor; **12*** – crankshaft position sensor; **13*** – fuel injectors; **14*** – ignition coils; **15*** – knock sensor; **16** – intake air temperature sensor

---

* The item is not visible in the photo.

The engine is equipped with a multi-point fuel injection system (a separate injector for each cylinder) with electronic control and an exhaust gas toxicity reduction system.

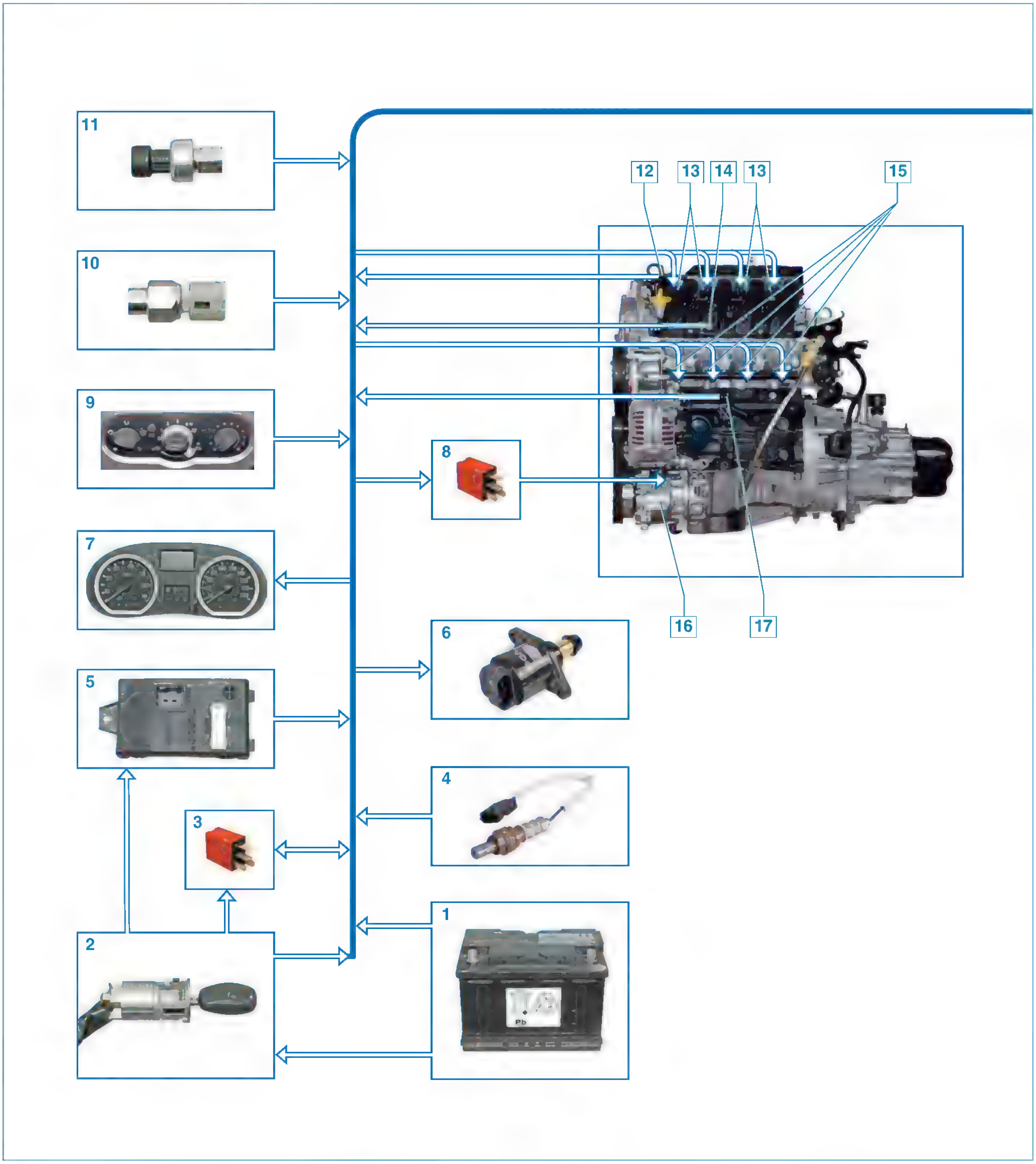
The engine management system consists of the engine electronic control unit (ECU), sensors for engine operating parameters and the vehicle, as well as actuators. The 90-channel**ЭБУ** is the central unit of the control unit for the engine.

engine.

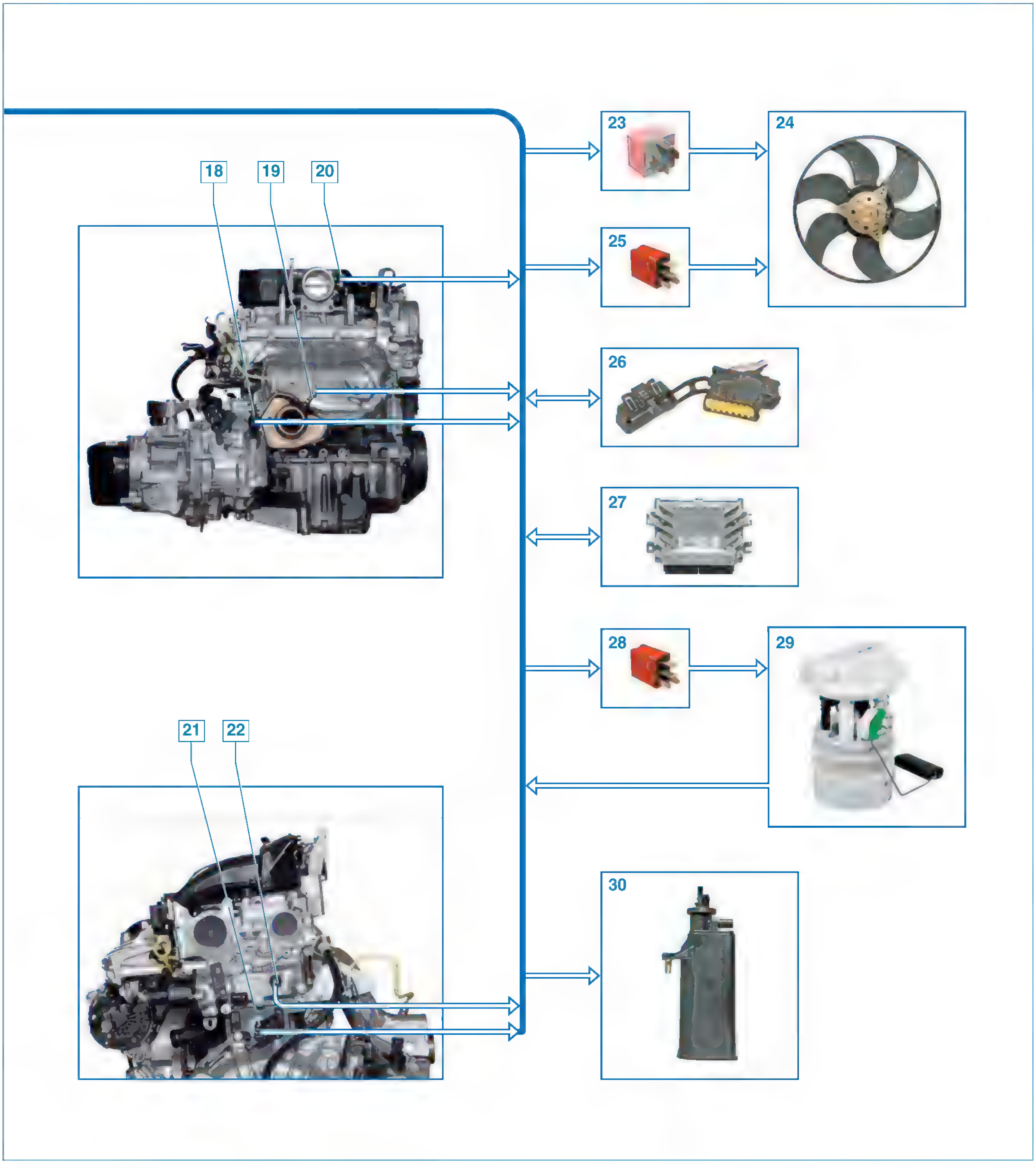
The ECU is mounted on the rear wall of the battery platform й б battery.

The ECU is a mini-computer designed for a specific purpose— it includes a random-access memory (RAM) and a programmable read-only memory (PROM).

RAM is used for temporary storage of current engine operation information (measured parameters) and computed data. RAM also stores the codes of emerging



Electronic engine management system diagram: **1** – battery; **2** – ignition switch; **3** – main relay; **4** – diagnostic oxygen sensor **5** – junction block; **6** – idle speed regulator; **7** – instrument cluster; **8** – air conditioning relay; **9** – heating, ventilation, and air-conditioning control unit; **10** – refrigerant pressure sensor; **11** – power steering pressure sensor; **12** – absolute intake air pressure sensor; **13** – ignition coils; **14** – intake air temperature sensor; **15** – injectors; **16** – compressor-



air conditioner fuse; **17** – knock sensor; **18** – vehicle speed sensor; **19** – oxygen sensor control; **20** – throttle position sensor; **21** – crankshaft position sensor; **22** – coolant temperature sensor; **23** – high-speed radiator fan relay; **24** – fan; **25** – low-speed radiator fan relay; **26** – diagnostic connector (diagnostic socket); **27** – engine control unit; **28** – fuel pump and ignition coil power relay; **29** – fuel module; **30** – purge valve solenoid of the charcoal canister

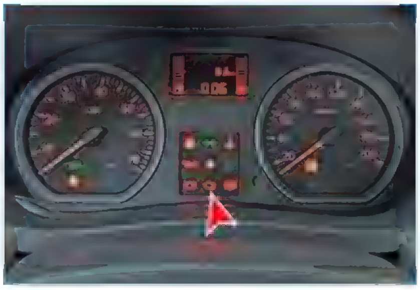
Engine Control Unit (ECU)

faults. This memory is volatile, i.e., when electrical power is interrupted (battery disconnected or wiring harness detached from the ECU) its contents are erased. PROM stores the engine control program, which contains a sequence of operational commands (algorithms) and calibration data (settings). PROM determines the most important engine operating parameters: the characteristics of torque and power changes, fuel consumption, ignition timing advance, composition of exhaust gases, etc. ROM is nonvolatile, i.e., its contents do not change when power is turned off.

The ECU receives information from the control system sensors, the switch, the air conditioning refrigerant pressure sensor, the power steering pressure sensor, and it also controls actuators such as the fuel pump, injectors, ignition coils, idle speed regulator, evaporative canister purge solenoid valve, cooling system electric fan, engine overheat indicator, air conditioning compressor electromagnetic clutch, and various system relays. When the ignition is turned on, the ECU sends a control signal to the main relay, and when the ignition is turned off, it delays the main relay shutdown for the time necessary to prepare for the next start (to finish calculations, complete the idle speed regulator adjustment, and to control the cooling system electric fan).

The ECU also performs diagnostic functions for the engine management system (on-board diagnostic system). The ECU detects faults in elements of the control system and saves fault codes in its memory. When a fault is detected, to prevent negative consequences (piston burning due to detonation, damage to the catalytic converter in case of misfires in the fuel-air mixture, exceeding allowable exhaust gas toxicity levels, etc.), the ECU activates the malfunction indicator in the instrument cluster and switches the system to emergency operating modes. The essence of these modes is that if any sensor or its circuit fails, the ECU uses substitute data stored in PROM to control the engine.

Engine management system fault indicator is located in the instrument cluster. If the system is functioning correctly, the indicator lights when the ignition is turned on and then goes out — this allows the ECU to check the onboard diagnostic system. If the indicator lights while the engine is running, it indicates that the onboard diagnostic system has detected a fault, and further driving will be in limp-home mode. It is prohibited to operate the vehicle with the indicator continuously lit or flashing in the instrument cluster. Driving the vehicle on its own is permitted (although some engine performance parameters — power, drivability, fuel economy — may deteriorate) to reach a service station to fix the fault. If the fault is intermittent



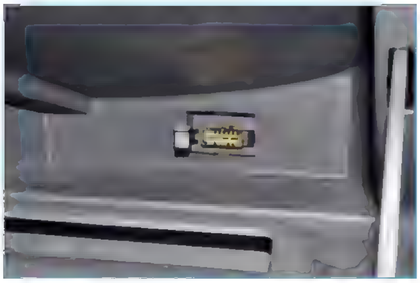
Engine Management System Fault Indicator in the instrument cluster

the ECU will switch off the indicator after 10 s, provided there are no other fault codes in the unit's memory that require the indicator to be activated.

Fault codes remain stored in the ECU memory and can be read using a diagnostic tool connected to the **diagnostic connector (diagnostic plug)** located in the glove compartment.

Crankshaft position sensor (CPS) is mounted on the clutch housing, above the engine flywheel.

The sensor provides the ECU with information about the crankshaft's rotational speed and angular position. The sensor is of the inductive type and responds to the passage of the flywheel ring gear teeth past its core. The teeth are spaced at 6° intervals on the disc. To synchronize with TDC of pistons 1–4, one tooth out of 60 is cut away to form a gap, and one tooth is double. When the double tooth and the gap pass the sensor, it generates

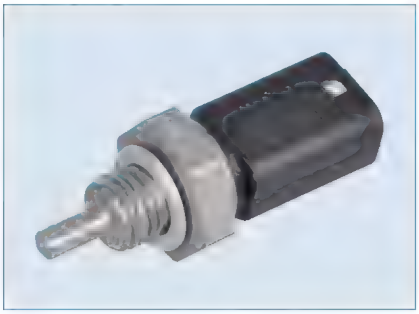


Diagnostic Connector

Crankshaft Position Sensor

This generates the so-called " reference" synchronization pulse. As the flywheel rotates, the magnetic flux in the sensor's magnetic circuit changes — AC voltage pulses are induced in its winding. From the number and frequency of these pulses, the ECU calculates the phase and duration of the control pulses for the injectors and the ignition coil. If the CKP sensor or its circuits fail, the engine will not run.**Coolant temperature sensor (CTS)** is screwed into the threaded hole of the thermostat housing located on the left end of the cylinder head. The sensor provides information to the ECU, the coolant temperature gauge, and the engine overheating indicator in the instrument cluster.

The sensor is a thermistor with a negative temperature coefficient, i. e., its resistance decreases as temperature rises. The ECU supplies the sensor with a stabilized voltage of +5 V and, based on the voltage drop across the sensor, calculates the coolant temperature, the values of which are used by most engine control functions. If a fault occurs in the sensor or its circuits, the ECU switches the cooling system fan to continuous operation and estimates the temperature using a fallback algorithm.



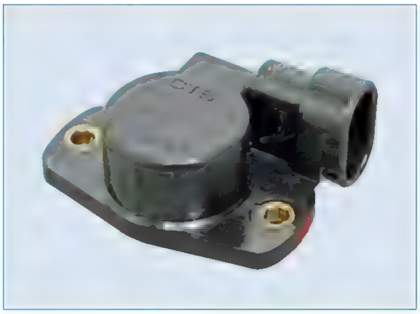
Coolant Temperature Sensor

Throttle position sensor (TPS) is mounted on the throttle shaft of the throttle assembly and is a potentiometer-type sensor.

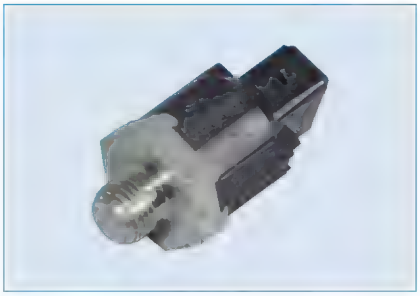
A stabilized voltage of +5 V from the ECU is applied to one end of its winding, while the other end is connected to the ECU ground. The signal for the ECU is taken from the third terminal of the potentiometer (the wiper). By periodically measuring the TPS output signal voltage, the ECU determines the current throttle position to calculate ignition advance angle and fuel injection pulse duration, and to control the idle speed regulator.

If the sensor or its circuits fail, the ECU estimates the throttle position based on crankshaft rotational speed and air flow.

Detonation sensor (DS) is screwed into a threaded hole in the front wall of the engine block, located in the area between the 2nd and 3rd cylinders.



Throttle position sensor



Knock Sensor

The piezoceramic sensing element of the sensor generates an alternating voltage signal whose amplitude and frequency correspond to the engine vibration characteristics. When detonation occurs, the amplitude of vibrations at a specific frequency increases. To suppress the detonation, the ECU adjusts the ignition timing advance.

Two oxygen concentration sensors are used in the control system.

The controlling oxygen concentration sensor (UDKK) is installed in the inlet pipe of the exhaust gas discharge system before the catalytic converter. The sensor is a galvanic current source whose output voltage depends on the oxygen concentration in the medium surrounding the sensor. The ECU calculates the fuel injection pulse duration based on parameters such as air flow, crankshaft speed, coolant temperature, and throttle position. From the UDKK signal indicating the presence of oxygen in the exhaust gases, the ECU adjusts fuel delivery by the injectors so that the composition of the exhaust gases is optimal for effective operation of the catalytic converter. Oxygen contained in the exhaust gases, after undergoing a chemical reaction with the sensor electrodes, creates a potential difference at the sensor output that varies approximately from 100±100 mV up to 800 ±100 mV. A low signal level corresponds to a lean mixture (presence of oxygen), and a high level to a rich mixture (absence of oxygen). When the O2 sensor is cold, the sensor output signal is absent because its internal resistance in this state is very high — several megaohms (the engine control system operates in open-loop mode). For normal operation the oxygen sensor must have a temperature of at least 300 °C, so a heating element controlled by the ECU is built into it for rapid warm-up after engine start. As the sensor warms up its resistance falls, and it begins to generate an output signal. The ECU constantly supplies a stabilized reference voltage to the sensor circuit. Until the sensor warms up, the ECU controls the injection system without taking the sensor voltage into account. As soon as the sensor warms up, the ECU turns off the sensor heater and begins to use the oxygen sensor signal to control fuel delivery in closed-loop mode. The oxygen sensor can be “ poisoned” as a result of using leaded gasoline or by using sealants during engine assembly that contain a large amount of silicone (silicon compounds) with high volatility. Silicone vapors can reach the combustion chamber through the crankcase ventilation system. The presence of lead or silicon compounds in the exhaust gases can lead to sensor failure. If the sensor or its circuits fail, the ECU records the corresponding fault code in its memory and controls fuel delivery in open-loop mode.

Control oxygen concentration sensor

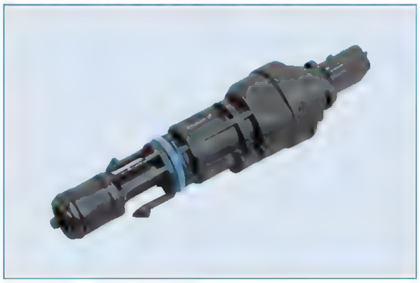
Diagnostic oxygen concentration sensor

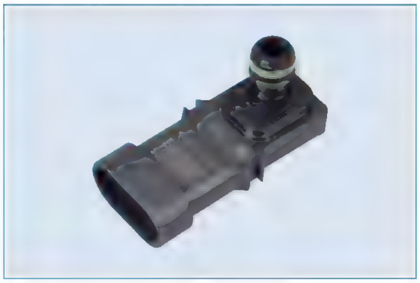
Diagnostic oxygen concentration sensor (DOCS) is installed in the exhaust pipe downstream of the catalytic converter. Its function includes diagnosing (evaluating the performance of) the catalytic converter and providing secondary, more precise control of the fuel–air mixture enrichment (the slow-control system). The signal generated by the sensor indicates the presence of oxygen in the exhaust gases after the catalytic converter. If the converter is operating normally, the readings of the diagnostic sensor will differ from those of the control sensor (at a constant vehicle speed the voltage at the sensor terminals should vary within the range of 600±100 mV, and during deceleration — below 200 mV). The operating principle of the diagnostic sensor is the same as that of the control oxygen concentration sensor, but the sensors are not interchangeable.

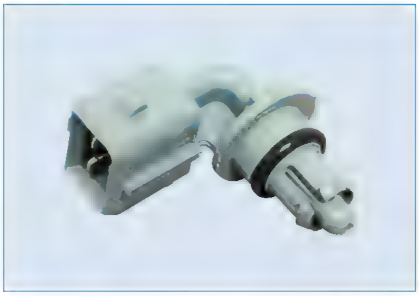
The vehicle speed sensor (VSS) is mounted on top of the transmission housing. The sensor is driven by a gear mounted on the differential housing.

The operating principle of the speed sensor is based on the Hall effect. The sensor sends rectangular voltage pulses to the ECU with a frequency proportional to the rotational speed of the drive wheels. The number of sensor pulses is proportional to the distance traveled by the vehicle. The ECU determines vehicle speed from the pulse frequency. If the sensor or its circuits fail, the ECU records a fault code in its memory.**The intake air absolute pressure sensor (MAP)** is mounted on the right side of the intake manifold.

The sensor contains a sensitive piezo element and a load variable resistor. The ECU supplies the sensor resistor with a stabilized voltage of +5 V. The sensor's piezo element reacts to changes in pressure (vacuum) in the intake manifold and alters the reference voltage delivered to the load resistor. The ECU takes this voltage change into account when calculating the amount of air entering the engine. Upon


Vehicle speed sensor


Absolute air pressure sensor



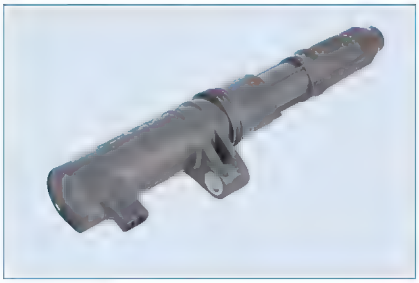
Intake Air Temperature Sensor

If the sensor or its circuits fail, the ECU records a fault code in its memory.

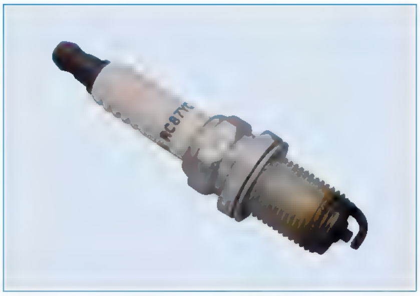
The intake air temperature sensor (IAT) is installed at the front of the intake manifold.

The sensor is a thermistor with a negative temperature coefficient, meaning its resistance decreases as temperature rises. The sensor changes its resistance depending on the air temperature in the intake duct. The ECU uses the information from the sensor to calculate the engine air flow and to adjust the ignition timing. If the sensor or its circuits fail, the ECU records a fault code in its memory.

Ignition system is part of the engine management system and consists of individual ignition coils and spark plugs for each cylinder. High-voltage wires are absent in the ignition system – the coil terminal is fitted directly onto the plug. In operation the system requires no maintenance or adjustment, apart from replacing the spark plugs. If an ignition coil fails, it is replaced.



Ignition Coil



Spark plug

The ECU controls current in the primary windings of the ignition coils depending on the engine operating mode. The coils are powered in pairs sequentially. Thus, a spark occurs simultaneously in two cylinders (1–4 or 2–3) — in one at the end of the compression stroke (the working spark) and in the other at the end of the exhaust stroke (the wasted spark). The ignition coil is non-serviceable; if it fails, it must be replaced.

Spark plugs with a noise-suppressing resistor of 6 kΩ±1, 5. The gap between the spark plug electrodes is 0.9–1.0 mm, and the hex size for the wrench is 16 mm.

The relays and fuses of the fuel injection system are located in the fuse/relay box installed in the engine compartment (see "Electrical Equipment", p. 240).

Control system operation

When the ignition is switched on, the ECU activates the control system: it turns on the fuel pump to create the required pressure in the fuel rail and processes the signals from the temperature sensors of the coolant and the throttle position to calculate the composition of the air–fuel mixture during engine start. If the crankshaft is not turned by the starter within this time, the ECU switches off the fuel pump after 2 seconds and switches it on again once cranking begins.

During engine operation the ECU processes information from sensors (crankshaft position, throttle position, engine coolant temperature, absolute intake air pressure, intake air temperature, vehicle speed, oxygen concentration). Depending on the engine operating mode, the ECU controls the fuel injectors, ignition coils, idle speed regulator, purge valve for the charcoal canister, and the engine cooling fan. When the air conditioner is switched on, the ECU increases the engine idle speed and sends a signal to engage the air conditioning compressor clutch.

The ECU calculates the ignition timing advance depending on the engine crankshaft speed, engine load, and coolant temperature.

The mixture composition is controlled by the duration of the control pulse supplied to the injectors—the longer the pulse, the greater the fuel delivery, and vice versa.

Under normal operating conditions, fuel injection is performed sequentially, into each cylinder at the start of the intake stroke. For this, the ECU uses information from the crankshaft position sensor, which determines the TDC of pistons in cylinders 1 and 4, and also 2 and 3. The system lacks a camshaft position sensor (phase sensor). Therefore, to determine in which of the two

When fuel needs to be injected into the cylinders, the ECU uses the following algorithm. Each time the engine is stopped, the ECU stores which injector was activated last, and on the next start the command is first sent to that injector. If fuel is injected into a cylinder not at the beginning of the intake stroke, the ECU runs a verification routine to determine the correct injection order for the cylinders.

If there is no signal from the crankshaft position sensor (the shaft is not turning or the sensor and its circuits are faulty), the ECU disables fuel delivery to the cylinders. Fuel delivery is also cut off when the ignition is turned off, which prevents the mixture in the engine cylinders from self-igniting.

During engine braking (with a gear engaged and the clutch engaged), when the throttle valve is fully closed and the engine crankshaft speed is high, fuel injection is suspended to reduce the toxicity of the exhaust gases.

When the onboard voltage of the vehicle drops, the ECU increases the energy accumulation time in the ignition coils (to ensure reliable ignition of the air–fuel mixture) and the duration of the injection pulse (to compensate for the increased injector opening time). When the onboard voltage rises, the energy accumulation time in the ignition coils and the duration of the pulse supplied to the injectors decrease.

The ECU controls the activation of the cooling system electric fan (via a relay) depending on engine temperature, crankshaft rotational speed, and air conditioner operation (if installed). The cooling system electric fan is activated, if the coolant temperature exceeds the allowable value.

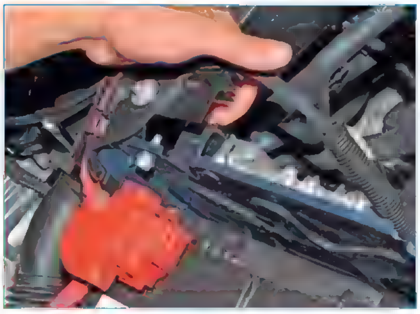
When servicing and repairing the engine management system, always switch off the ignition (in some cases it is necessary to disconnect the wire terminal from the negative terminal of the battery). When performing welding on the vehicle, disconnect the wiring harnesses of the engine management system from the ECU. Before drying the vehicle in a drying chamber (after painting), remove the ECU. Do not disconnect or adjust the connectors of the engine management system wiring harness or the wire terminals on a running engine,

battery terminal.

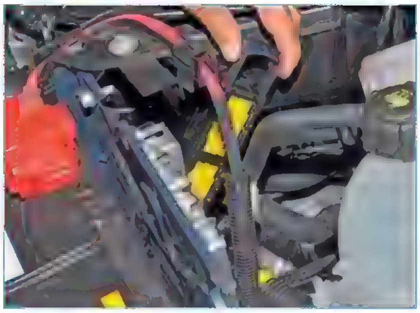
Do not start the engine if the wire terminal clamps on the battery terminals or the engine ground wire lugs are loose or dirty. The ECU contains electronic components that can be damaged by static electricity, so do not touch its terminals with your hands.

Removing the electronic control unit

The unit is removed for replacement or when performing repair operations on the vehicle that could damage the unit's electronic components (for example, when drying the vehicle in a drying oven after painting, etc.). Disconnect the wire from the battery negative terminal.

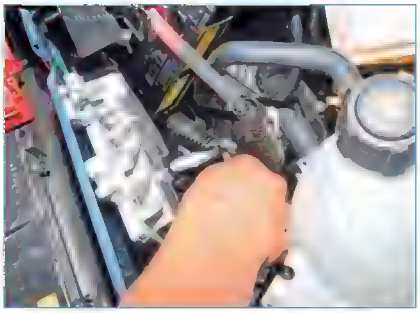


Lift up the locking tab of the engine management wiring harness connector...

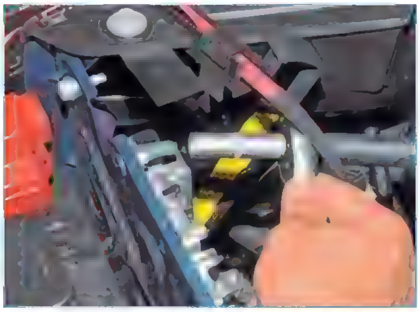


...and disconnect the wiring harness connector from the unit's socket.

Using a 10 mm socket wrench, loosen...



...the stud nut of the lower mounting that secures the unit to the battery tray...



...and the stud nut of the upper mounting.

Remove the control unit from the studs on the battery tray.

Install the electronic engine control unit in the reverse order.

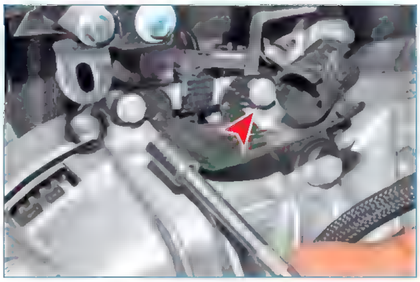
Removing the crankshaft position sensor

Remove the crankshaft position sensor for inspection or replacement, and also when removing the transmission. Remove the air-duct resonator. Disconnect the wiring harness connector of the engine management system from the coolant temperature sensor (see " Removing the coolant temperature sensor," p. 157). For clarity, the sensor removal procedure is shown with the heater radiator hoses removed.

Unclip the plastic retainer securing the engine wiring harness...

...and move the wiring harness away from the crankshaft position sensor.

Press the latch on the engine management system wiring harness connector and pull the connector off the crankshaft position sensor plug.



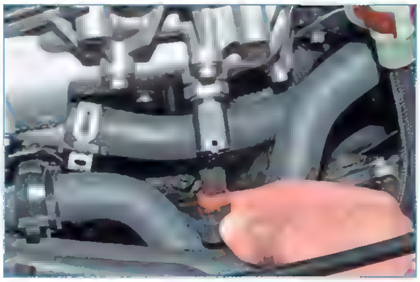
Using a 10 mm socket, loosen the two bolts securing the sensor and the wiring-harness bracket.

Remove the sensor and the wiring-harness bracket.

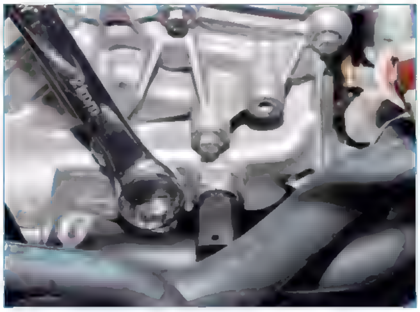
Install the crankshaft position sensor in reverse order. Tighten the sensor mounting bolts to the specified torque (see " Appendices," p. 315).

Coolant Temperature Sensor Removal

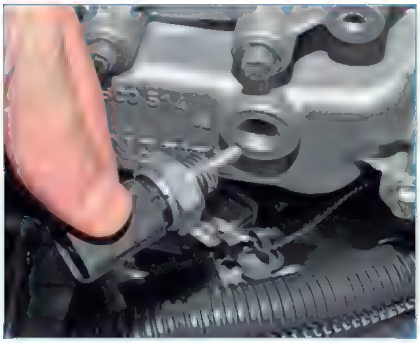
Remove the coolant temperature sensor for replacement. The sensor is threaded into the thermostat housing. Before removing the sensor, you should first drain some coolant from the engine (to the level of the sensor opening). If you have a replacement sensor on hand, you can remove the sensor without draining the coolant, then plug the opening with your finger to prevent fluid loss while you thread in the new sensor. Remove the air-tract resonator. With the ignition off, release the retainer on the engine management system wiring-harness connector...



...and disconnect the wiring-harness plug from the sensor connector.



Unscrew the sensor from the thermostat housing with a 21 mm box wrench.



The sensor's connection to the thermostat housing is sealed with an aluminiu-

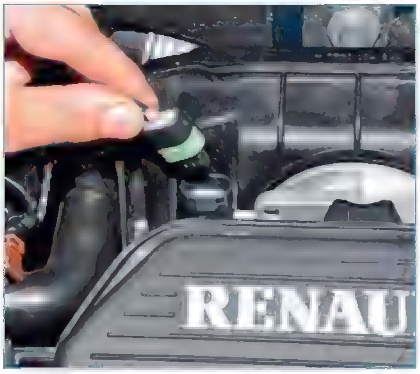
the hub is sealed with an aluminum washer.

Install the coolant temperature sensor in the reverse order. Tighten the sensor to the specified torque (see “Appendices”, p. 315).

Check and, if necessary, bring the coolant level in the expansion tank up to the correct level.

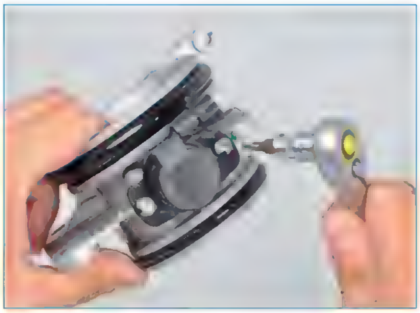
Removing the throttle position sensor

Remove the throttle position sensor for replacement. With the ignition off, press the latch of the engine management wiring harness connector...

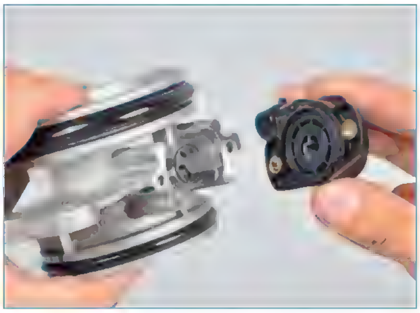


...disconnect the plug from the throttle position sensor connector.

Remove the throttle assembly (see "Removing the throttle
узла», p. 165).



Using a Torx T-20 key, loosen the two screws securing the sensor to the throttle body housing...

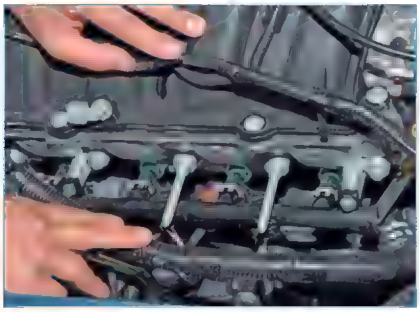


...and remove the sensor from the throttle shaft.

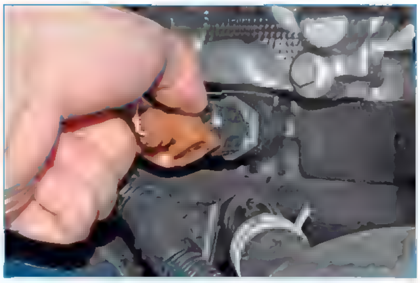
Install the sensor in reverse order. The sensor can be mounted on the shaft in only one position when the throttle valve is closed.

Removing the knock sensor

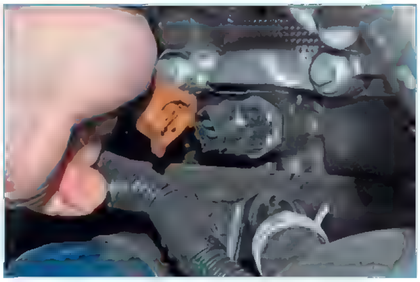
Remove the sensor for inspection and replacement, and also when repairing the engine. Remove the fuel rail cover (see “Removing the fuel rail cover,” p. 139).



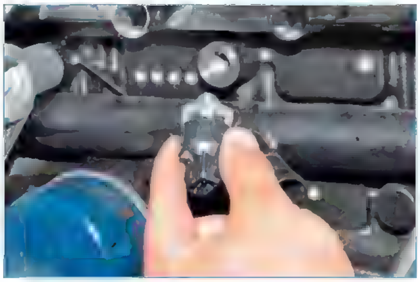
Move the wire harnesses away from the knock sensor mounting location.



Press the wire retainer on the wiring harness connector of the engine management system...



...disconnect the plug from the sensor connector. Use a 24 mm socket to loosen...



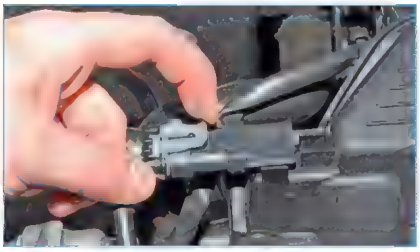
...and remove the knock sensor.

Before installing the sensor, clean its mounting area on the cylinder block. Install the knock sensor in reverse order.

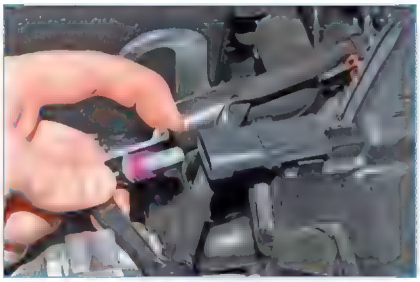
and tighten the sensor to the specified torque (see “Appendices,” p. 315).

Removing the absolute air pressure sensor

The sensor is removed to replace its sealing rubber rings or the sensor itself. With the ignition off...

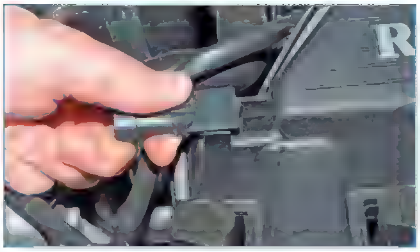


...by pressing the locking tab of the engine management wiring harness connector...



...disconnect the wiring harness plug from the sensor connector.

Overcoming the resistance of the sensor's rubber sealing rings...



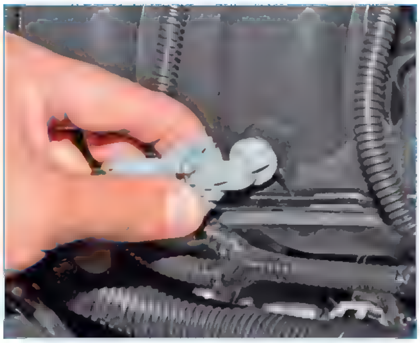
...pull the sensor out of the receiver opening.

If the rings have damage such as cracks or tears, or if the rubber has lost its elasticity, replace the rings with new ones. Install the absolute air pressure sensor in reverse order.

Removing the intake air temperature sensor

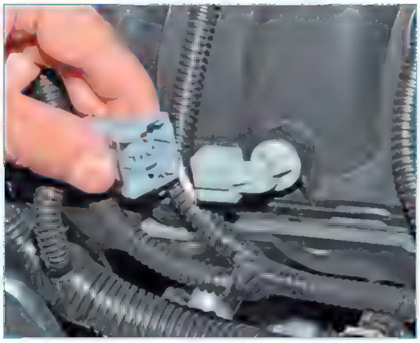
at the intake

Remove the sensor to replace the failed sealing rubber ring or the sensor itself. With the ignition off...



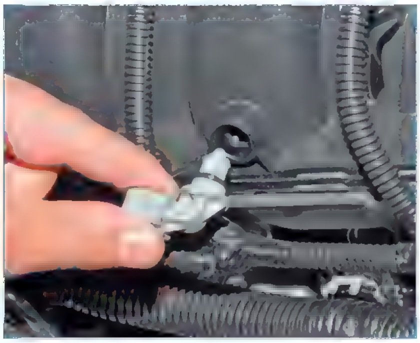
...press the wire retainer of the wiring harness connector of the system

we disconnect the engine control...



...and unplug the connector from the sensor's socket.

Overcoming the resistance of the sensor's plastic retaining clips...



...we pull the sensor out of the receiver opening.

If the sensor's sealing ring has damage such as cracks or tears, or if the rubber has lost its elasticity, replace the ring with a new one.

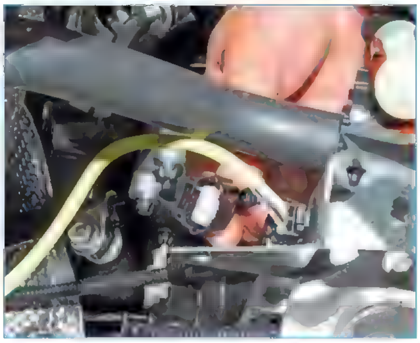
Install the air temperature sensor in the reverse sequence. When installing the sensor, insert its retainers into the corresponding slots of the receiver opening.

Removal of oxygen concentration sensors

Remove the sensors for replacement, and also when dismantling the exhaust system. Perform the work only after the exhaust system components have cooled.

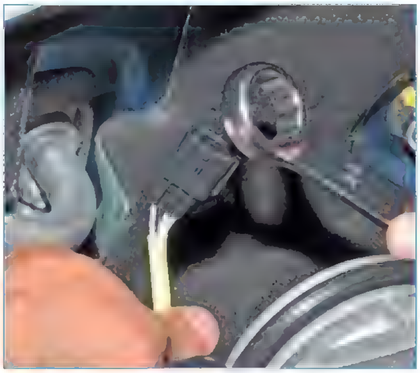
Removal of the control oxygen concentration sensor

Remove the air filter housing (see " Removing the air filter housing," p. 166). With the ignition off, press back the connector retainer of the engine management wiring harness...

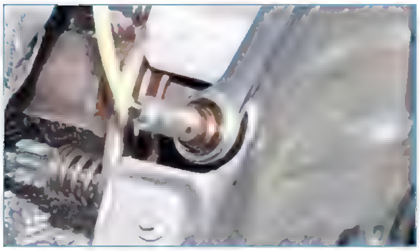


...and disconnect the plug from the connector of the control oxygen concentration sensor wiring harness.

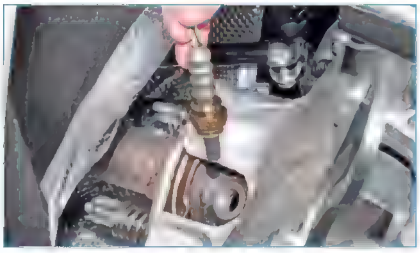
Pull the sensor wiring harness plug out of the holder.



Thread the sensor harness connector through the ring of the 22 mm open-end wrench...



...place the key ring onto the sensor's hex...

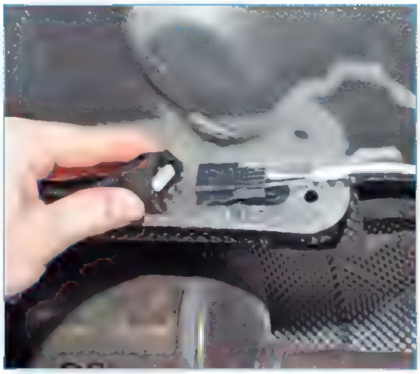


...and unscrew the sensor from the exhaust manifold opening.

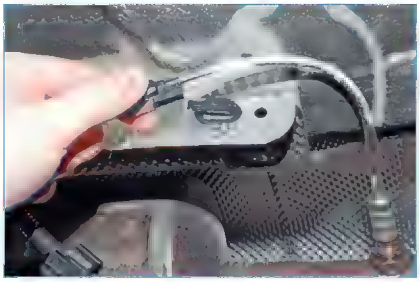
Install the oxygen concentration control sensor in reverse order. Before installation, apply a thin layer of graphite grease to the sensor's thread, taking care not to allow it to enter the sensor through the hole in its tip. Tighten the sensor to the specified torque (see “Appendices”, p. 315).

Removal of the diagnostic oxygen concentration sensor

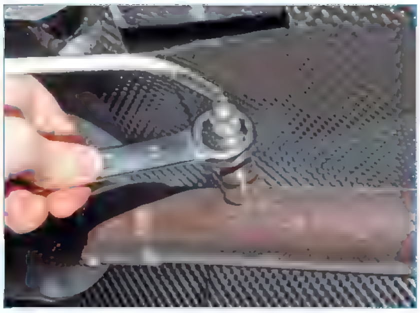
Work is carried out on an inspection pit or ramp. From beneath the vehicle, with the ignition off, depress the locking tab of the engine management system wiring harness connector...



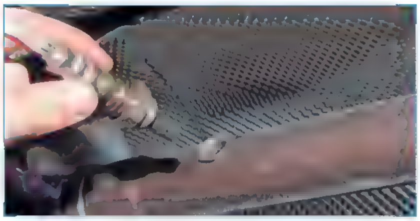
...disconnect the wiring harness plug from the sensor's connector.



Remove the sensor wire connector from the holder mounted on the heat shield.



Thread the sensor wiring block through the ring of the 22 mm wrench and, placing the wrench's ring on the sensor hexagon...



...unscrew the sensor from the threaded hole in the pipe.

Install the diagnostic oxygen concentration sensor in the reverse order. Before installation, apply a thin layer of graphite grease to its thread, taking care not to allow any to enter the sensor through the hole in its tip. Tighten the sensor to the specified torque (see "Appendices", p. 315).

Removing the speed sensor

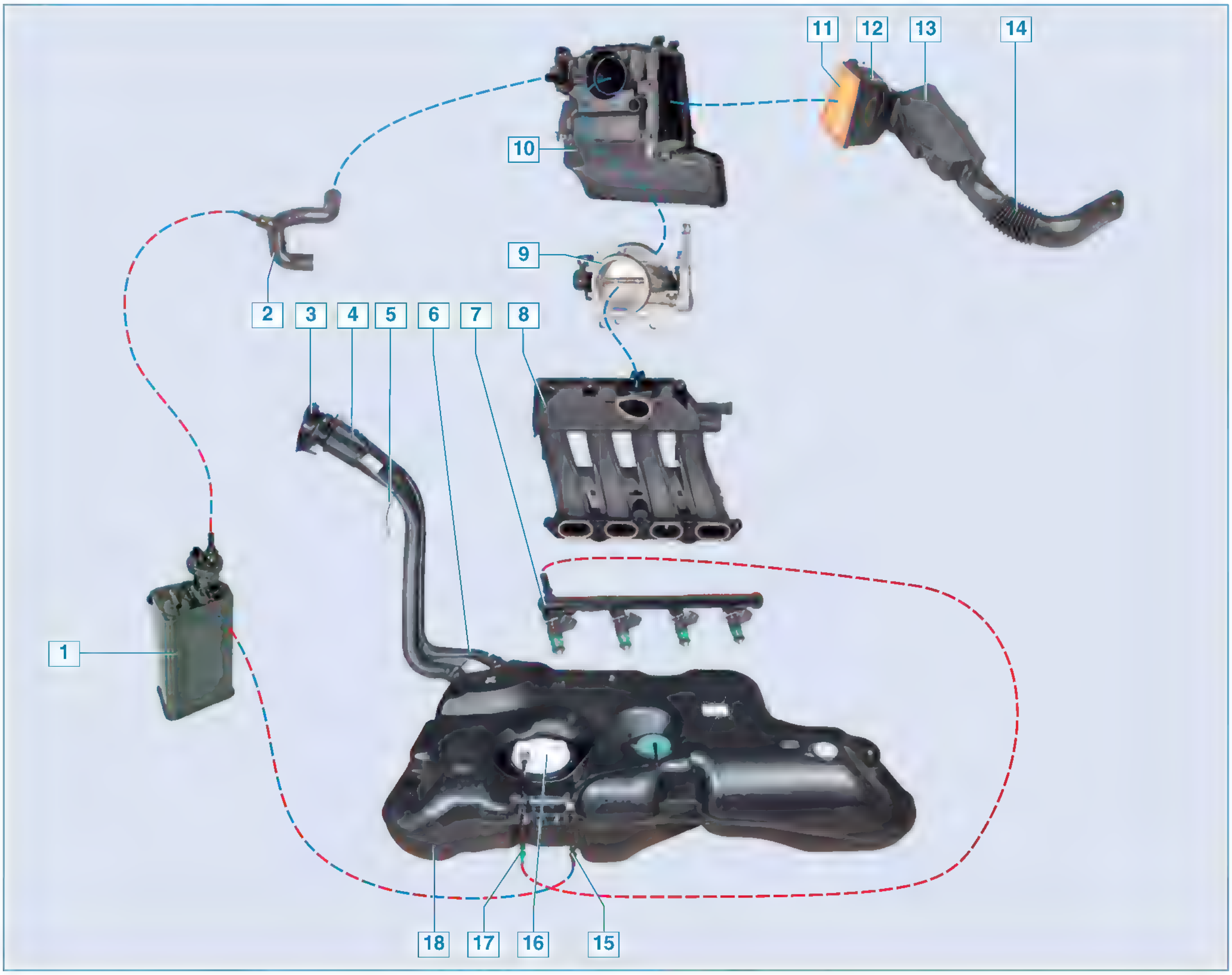
Removing the speed sensor on a vehicle with the 1.6 (16V) engine is similar to removing the speed sensor on a vehicle with the 1.6 (8V) engine (see “Removing the speed sensor,” p. 110).

Removing the ignition coil

Remove the ignition coil for inspection and replacement, and to access the spark plugs (see “Replacing the spark plugs of the 1.6 (16V) engine,” p. 40).

1.6 (16V) engine fuel system

Design description



Fuel system components: 1 – canister; **2** – idle air supply hose; **3** – filler neck; **4** – fuel tank filler pipe; 5 – ground wire; **6** – fuel tank vent tube; **7** – fuel rail; **8** – intake manifold; **9** – throttle assembly; **10** – air filter housing; **11** – replaceable air filter element; **12** – air filter cover;**13** – intake resonator; **14** – air intake; **15** – fuel vapor line to canister; **16** – fuel module;**17** – fuel feed line to the rail; **18** – fuel tank

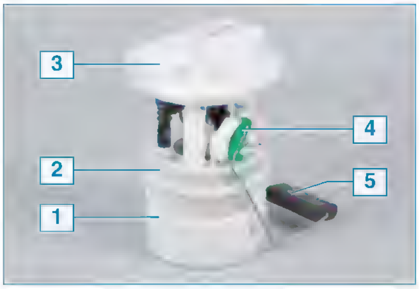
Fuel is supplied from a tank installed under the floor in the rear seat area. The fuel tank, filler pipe, and vent tube are made of plastic. The connection of the filler pipe and vent tube to the tank fittings is non-detachable. At the top of the filler pipe, there is a neck that is fastened to the body. The vent tube serves

to discharge air displaced from the tank during refueling.

Fuel module, including a fuel pump, fuel pressure regulator, fuel filter and fuel level sensor, is installed in the fuel tank. For coarse fuel filtration

A mesh filter is installed at the module inlet.

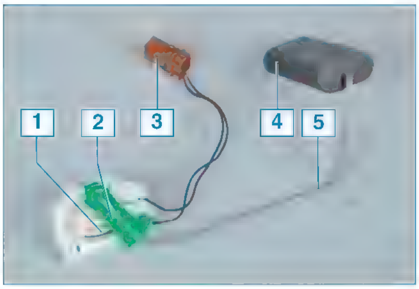
For access to the fuel module, a hatch is provided in the vehicle floor under the rear seat cushion.



Fuel module: 1 – cup; **2** – fuel filter; **3** – module cover;**4** – fuel level sensor; **5** – float

The fuel level sensor is attached to the housing of the fuel module. The fuel level sensor is a variable resistor whose resistance depends on the movement of the float. It controls the operation of the fuel gauge and the low-fuel warning light. The fuel pump is located inside the fuel module housing. The pump is electric, submersible, and rotary. It is activated by the ECU when the ignition is turned on and supplies fuel to the line under pressure (about 6.0 bar), exceeding the operating pressure in the rail.

Fuel, as it passes through the pump while it is running, lubricates and cools the pump. Therefore, it is forbidden to run the pump even for a short time if there is no fuel in the tank. The fuel pump capacity is at least 60 l/h.



Fuel level sensor: 1 – resistor; **2** – slider; **3** – sensor wiring connector; **4** – float; **5** – float arm

Fuel pump

From the pump, fuel is delivered under pressure to the fuel filter. The fuel filter is part of the fuel module and must be replaced only together with it. It is designed to clean the fuel of mechanical impurities with a filtration fineness of up to 10 µm.

The fuel pressure regulator is non-serviceable and is part of the fuel module; if it fails, it must be replaced together with the module. Fuel pressure in the fuel rail with the ignition on and the engine not running should be about 3.2 bar.

Fuel rail is a tube made of high-strength, heat-resistant plastic on which the injectors are mounted. The rail is attached to the intake manifold with two screws. On the right side of the rail there is a fitting to which the pressurized fuel line is connected.

Pressurized fuel is supplied into the internal cavity of the rail, and from there — through the injectors into the intake manifold.

Fuel rail with injectors

The injector is an electro magnetic valve that injects fuel into the intake manifold channel when energized and is closed by a return spring when de-energized.

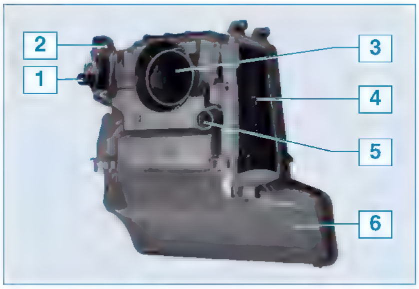
At the outlet, the injector has a nozzle with four holes through which fuel is injected into the intake manifold channels. The ECU controls the injectors. The injectors are sealed in the rail and intake manifold with rubber O-rings and secured to the rail with metal clips. If the winding breaks or shorts, the injector should be replaced.

Air is supplied to the engine throttle assembly through the air intake, resonator, and air filter.

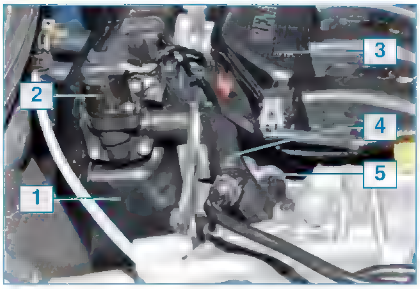
Resonator provides absorption of air pressure waves and reduces inlet noise.
Air filter housing is mounted on the rear side of the engine. The filter element is paper. The housing has a neck that fits over the throttle assembly pipe. A breather separator hose from the crankcase ventilation system connects to the filter housing fitting through a rubber sleeve.

Throttle body assembly is made of aluminum alloy and is the throttle valve housing on which the throttle position sensor is mounted.

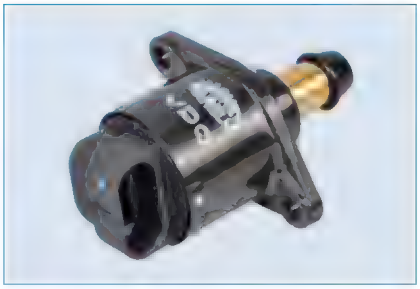
Injector with sealing rings



Air filter housing: 1 – idle circuit fitting; **2** – idle speed controller; **3** – connection neck to the throttle assembly; **4** – air inlet to the air filter housing; **5** – crankcase gas inlet fitting; **6** – filter housing



Air from the air filter housing 1, after passing through the IAC 2, is delivered via rubber hose 4 to pipe 5 of the oil separator housing and from there, through the air channel in the oil separator housing, flows into receiver 3.



Idle speed controller

The throttle assembly is installed between the air filter housing and the intake manifold.
When the accelerator pedal is pressed, the throttle valve opens, changing the amount of air entering the engine (fuel delivery is calculated by the ECU based on the air flow).

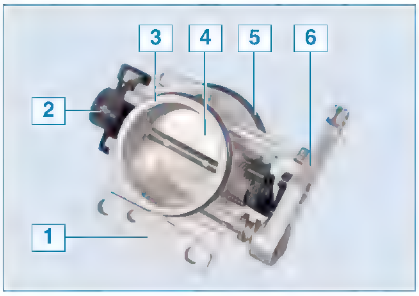
When the engine is idling (throttle valve closed), the ECU controls the air supply using the idle speed regulator.

Idle speed regulator (ISR) is mounted on the air filter housing. The ISR is a stepper motor with a micrometric screw (valve-type). The valve's closure element (needle) changes the channel's cross-section and provides regulation of the airflow bypassing the throttle valve.

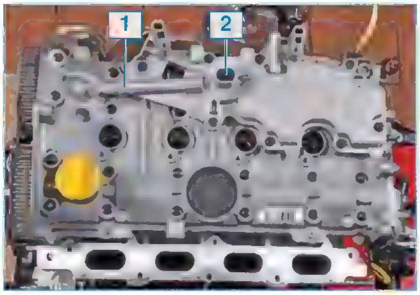
To increase the crankshaft speed at idle, the ECU sends a control signal to open the valve, increasing the airflow around the throttle valve; conversely, to reduce the speed a command is given to close the valve. During engine braking the throttle valve closes abruptly, and the IAC increases the airflow around the throttle valve, which results in leaning of the fuel mixture. This helps reduce the emission of hydrocarbons and carbon monoxide into the atmosphere. The idle speed regulator is non-serviceable and must be replaced if it fails.

After passing through the throttle assembly, air enters the intake manifold, which is made of high-strength heat-resistant plastic.
From the common cavity of the intake manifold, air flows through four separate channels to the intake runners. To ensure even filling of the engine cylinders with air, the manifold and intake runner channels are made approximately the same length.

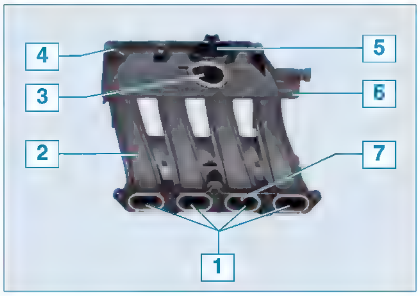
Fuel vapor capture system, used in the fuel supply system, includes an adsorber, an electromagnetic purge valve for the adsorber, connecting tubes and hoses.



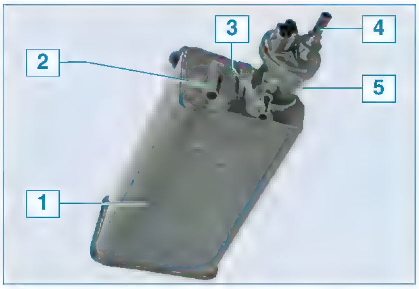
Throttle assembly: 1 – housing; **2** – throttle position sensor; **3** – connection pipe to the receiver; **4** – throttle plate; **5** – connection pipe to the air filter housing; **6** – throttle drive lever



Air supply (to the receiver at idle engine speed) through the channels in the oil separator (shown on a removed engine for clarity): 1 – hose connecting the oil separator to the ISC; **2** – hose connecting the oil separator to the receiver



Receiver components: 1 – air supply channels to the cylinder; **2** – receiver; **3** – port for air supply downstream of the idle speed controller; **4** – fitting for connecting the brake booster vacuum line; **5** – flange for connecting the throttle assembly; **6** – absolute intake air pressure sensor; **7** – intake air temperature sensor



Adsorber components: 1 – adsorber; **2** – air inlet fitting; **3** – fuel vapor return fitting from the tank; **4** – solenoid valve fitting; **5** – solenoid valve

From the tank, fuel vapors enter the canister (mounted under the front bumper, in front of the right wheel arch) through a fitting indicated by the arrow, where they are absorbed by the sorbent (activated carbon). The canister's second fitting is connected to the atmosphere. An electromagnetic purge valve is mounted on top of the canister. The valve is connected by a plastic tube to a rubber hose that directs air to the intake manifold through an oil separator, bypassing the throttle valve.

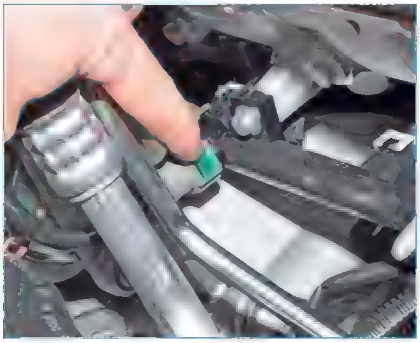
When the engine is stopped, the purge solenoid valve is closed, and in this case the canister is not connected to the receiver. The ECU controls the solenoid valve to purge the canister after the engine has run for a specified period from the moment fuel control switches to closed-loop operation (the upstream oxygen sensor must be warmed to operating temperature). The valve connects the canister chamber to the receiver, and the sorbent is purged: gasoline vapors mix with air and are drawn through the receiver into the intake tract and then into the engine cylinders. The greater the engine air flow, the longer the ECU control pulses and the more intense the purge.

Removing and disassembling the fuel module

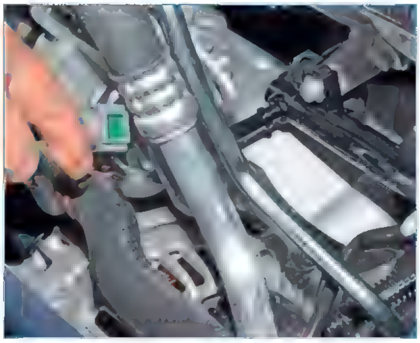
The procedures for removing and disassembling the fuel module on the vehicle with the 1.6 (16V) engine are similar to the procedures for removing and disassembling the fuel module on vehicles with the 1.4–1.6 (8V) engine (see " Removal and disassembly of the fuel module," p. 114).

Removing the fuel rail and injectors

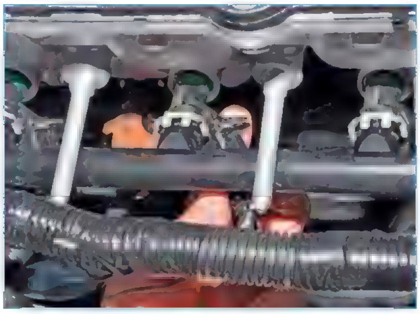
We remove the fuel rail to check the injectors' operation and to replace them. Relieve the pressure in the fuel system (see "Removing and disassembling the fuel module," p. 114). Disconnect the cable from the negative terminal of the battery. Remove the fuel rail cover (see "Removing the fuel rail cover," p. 139).



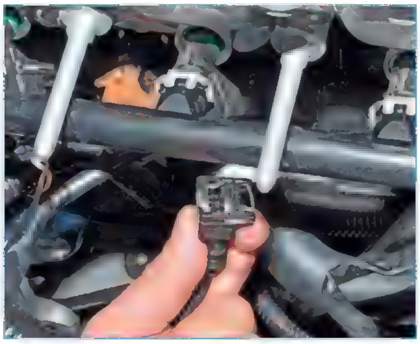
Compress the retainers...



...remove the fuel pipe nozzle from the fuel rail fitting.

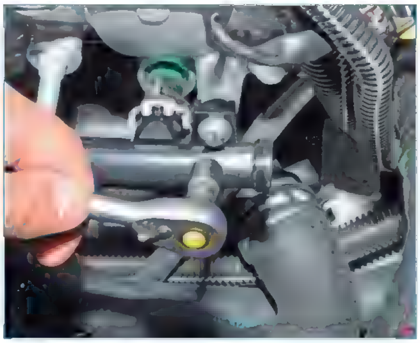


Pressing the spring clip...

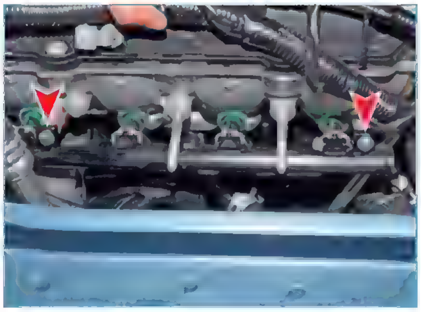


...disconnect the wiring connector from the injector.

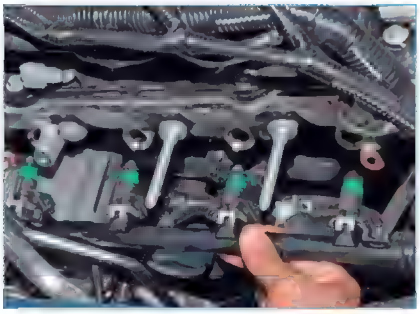
Similarly, disconnect the connectors of the wiring from the remaining injectors.



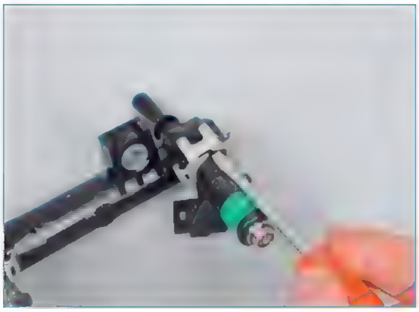
Using an 8 mm socket, loosen the two bolts that secure the fuel rail to the intake manifold.



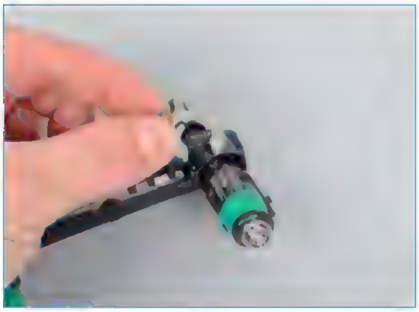
Location of the fuel rail mounting bolts.



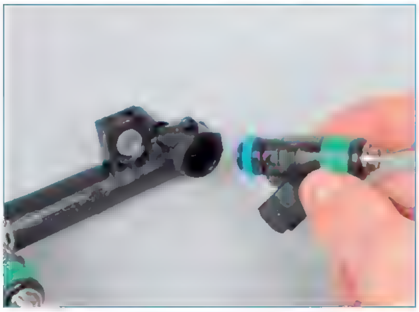
Slide the fuel rail along the injector axes so that all injectors come out of their seats in the intake manifold, then remove the rail together with the injectors.



Prying up with a screwdriver...



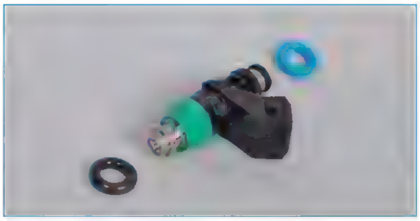
...remove the injector retainer.



Overcoming the resistance of the sealing ring, pull the injector out.

сунку из топливной рампы. Lifting it out with a thin slotted screwdriver-

who...



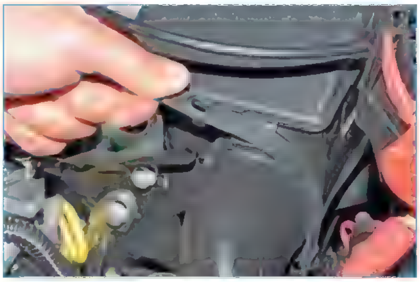
...remove the sealing rings of the injectors.

The injector is sealed with two rubber O-rings: a blue one in the fuel rail and a black one in the intake manifold. Remove the remaining injectors in the same way.

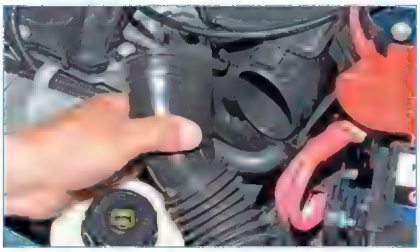
Replace the sealing rings with new ones. Reassemble and install the fuel rail with the injectors in the reverse order. Before installation, apply a thin layer of engine oil to the injector sealing rings.

Removing the air intake

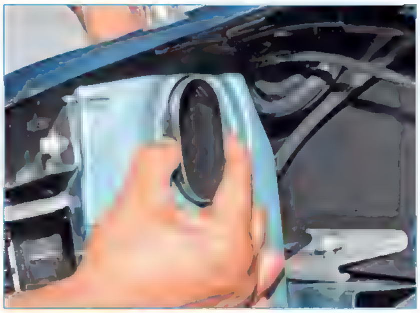
Remove the air intake for replacement, and also to gain access to the parts and assemblies located on the left side at the front of the engine compartment.



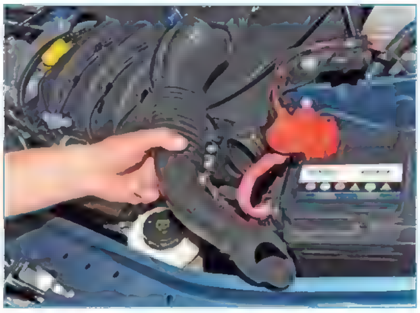
Unfasten the rubber clamp securing the resonator tuning...



...and remove the air intake from the resonator pipe.



By compressing the intake bell, you—pulling it out of the hole in the body...



...and remove the air intake. Install the air intake in reverse order.

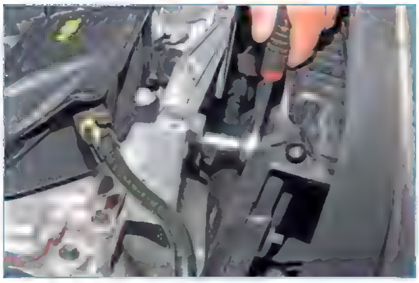
Removal of the throttle assembly

Remove the throttle assembly to replace the throttle position sensor or the assembly itself, and also if the rubber rings sealing the connection of the assembly to the intake manifold and the air filter housing are damaged.

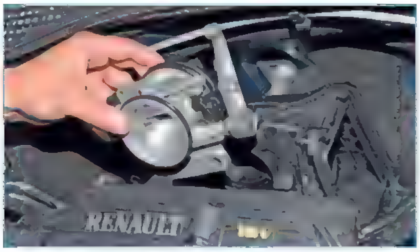
After loosening the two screws securing the air filter housing (see “ Removing the air filter housing,” p. 166), move the housing toward the front bulkhead.

Disconnect the wiring harness connector for the engine management system from the throttle position sensor (see “ Removing the throttle position sensor,” p. 158).

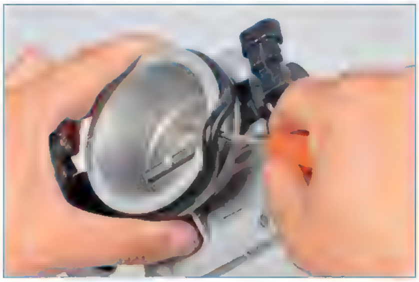
Disconnect the throttle cable end from the throttle drive lever (see “ Replacing the throttle cable,” p. 169).



Using an 8 mm socket, loosen the two bolts securing the throttle assembly to the intake manifold.

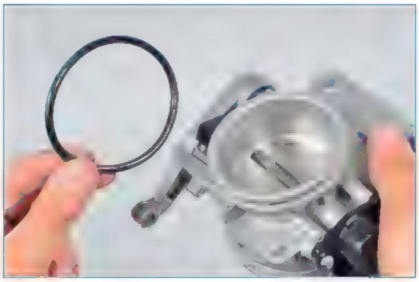


Remove the throttle assembly, overcoming the resistance of its rubber sealing ring. If the sealing rings have lost elasticity or are damaged, they must be replaced with new ones.



Use a screwdriver to pry up the rubber ring...

...and pull it out of the groove in the assembly's pipe.

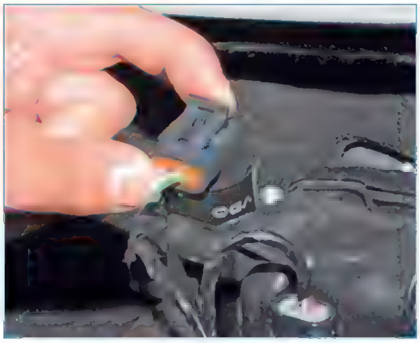


Similarly, remove the rubber sealing ring from the other assembly pipe.

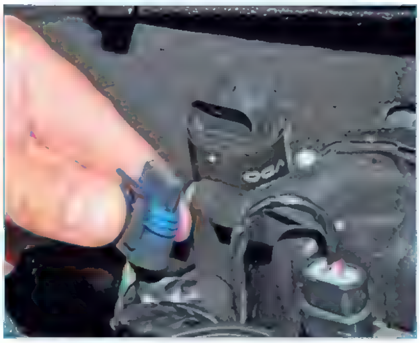
Reinstall the throttle assembly in the reverse order.

Removing the idle speed regulator

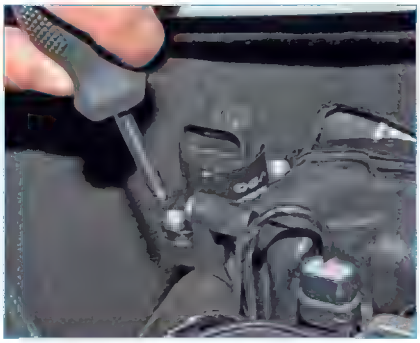
Remove the idle speed regulator for inspection and replacement. With the ignition off...



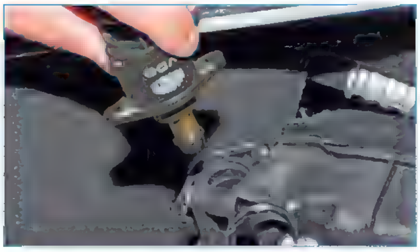
...pressing the retainer...



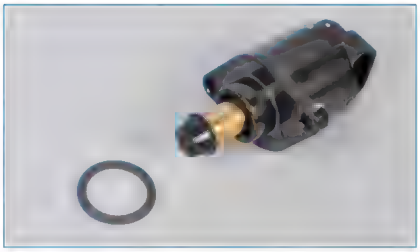
...disconnect the wiring harness connector of the engine management system from the regulator connector.



Use a Phillips screwdriver to unscrew the two screws securing the regulator to the air filter housing...



...and remove the regulator.

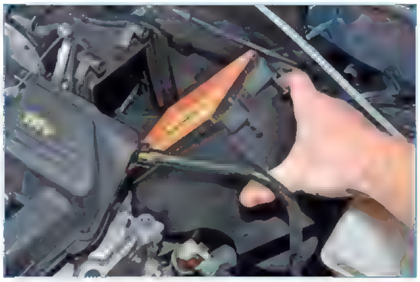


The connection between the regulator and the air filter housing is sealed with a rubber O-ring.

Before installing the idle speed regulator, clean the valve seat, the air passage, and the surface under the sealing O-ring in the air filter housing. Apply a thin layer of engine oil to the new regulator O-ring. Install the idle speed regulator in reverse order.

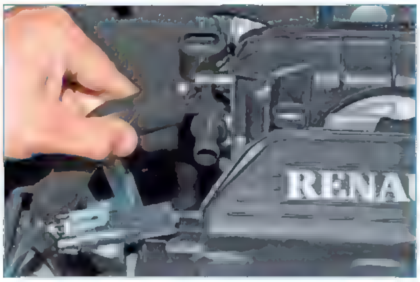
Removing the air filter housing

Remove the air filter housing for replacement, and also when disassembling the throttle assembly, the intake manifold (receiver), and the cylinder head cover.

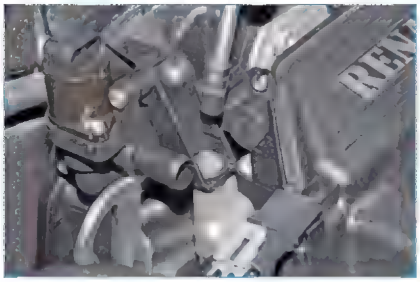


Remove the air filter housing cover (see “Replacing the engine 1.6 (16V) air filter element,” p. 40).

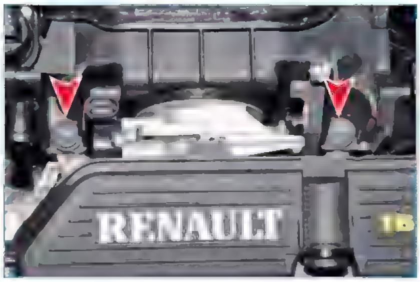
Disconnect the wiring harness connector of the engine management system from the idle speed regulator (see "Removing the idle speed regulator", p.166).



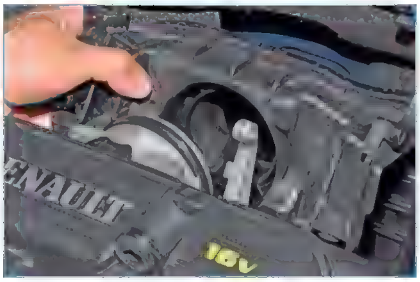
We remove from the housing pipe the air-idle speed hose of the air cleaner.



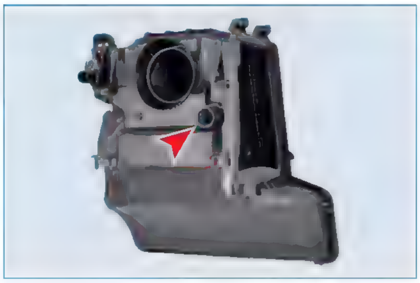
Using an E8 socket, loosen the two mounting screws— that secure the air cleaner housing to the cylinder head cover.



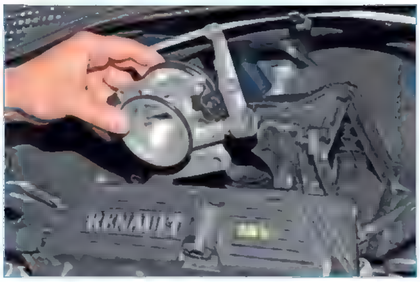
Location of the air cleaner housing mounting screws.



Move the air filter housing back away from the throttle assembly, overcoming the resistance of the rubber sealing ring. At the same time...



...the rubber sleeve of the fitting (part of the crankcase ventilation system) on the filter housing slides off the separator's pipe (shown on the removed filter housing for clarity).



Remove the throttle узел (see “Removing the throttle assembly”, p. 165).

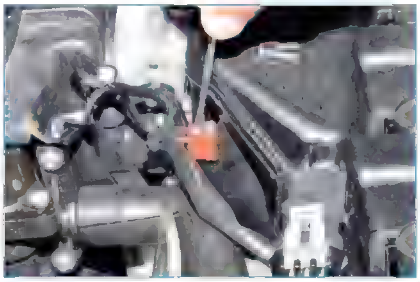
Pull out the air filter housing.

If the sealing sleeve of the crankcase ventilation fitting is po- **If it is cracked or has lost elasticity, replace it with a new one.**
Reinstall the air filter in reverse order.

Removing the receiver, replacing gaskets

Remove the receiver when repairing the cylinder head or to replace the sealing gaskets at the connection between the receiver and the intake pipe.

Disconnect the wiring harness connectors for the engine control system from the idle speed regulator and the throttle position sensor (see “Removing the Idle Speed Regulator,” p. 166 and “ Removing the Throttle Position Sensor,” p. 158).



Use a screwdriver to pry up the wiring-harness retainer for the idle speed regulator and the throttle position sensor...

...и сдвигаем его с ребра ресивера. Detach the end of the throttle cable from the throttle lever and pull the cable housing out of the bracket on the receiver (see “Replacing the throttle cable,” p. 169).

we disconnect the throttle drive from the throttle lever and pull the cable sheath out of the bracket on the receiver (see "Replacing the throttle cable", p. 169). We remove the throttle assembly (see “Removing the throttle assembly,” p. 165).

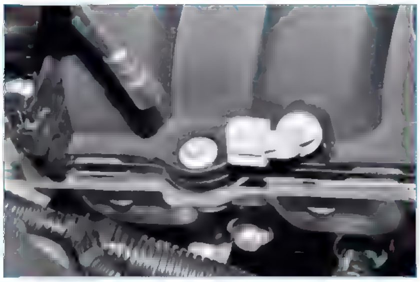
Disconnect the wiring harness connectors of the engine management system from the intake air temperature sensor (see “Removing the intake air temperature sensor,” p. 159) and from the absolute air pressure sensor (see “ Removing the absolute air pressure sensor,” p. 158).

Disconnect the wiring harness connectors of the engine management system from the four ignition coils (see “Replacing spark plugs on the 1.6 (16V) engine,” p. 40)...

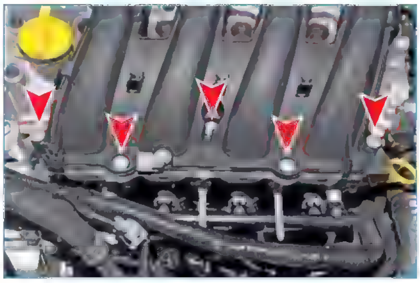
...and pull the coil wiring harnesses out of the four retainers on the receiver.

Disconnect the engine management wiring harness from the intake manifold.

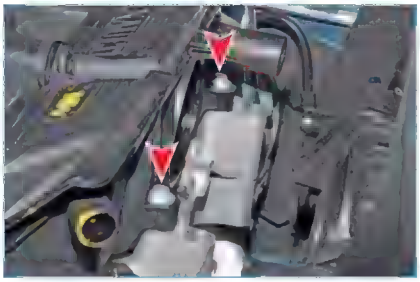
Disconnect the tube of the vacuum brake booster check valve from the receiver fitting (see “Removing the check vacuum brake booster valve", p. 231).



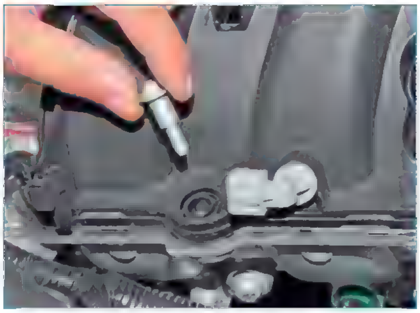
Using an 8 mm socket, unscrew the five bolts of the receiver's front mounting to the intake pipe.



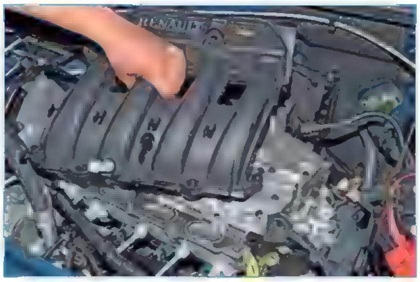
Location of the receiver's front mounting bolts.



Using the same tool, unscrew the two bolts of the rear mounting of the receiver to the cylinder head cover.

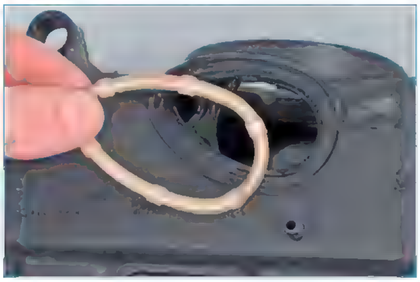


The receiver's mounting bolts are special—featuring a cylindrical collar for centering the receiver.



Remove the receiver assembly with the temperature and absolute air pressure sensors. If necessary, remove the sensors.

If the sealing gaskets at the connections to the oil separator and the intake pipe are damaged or have lost their elasticity, replace them with new ones.



To replace the gasket in the connection with the oil separator, remove it from the slot in the receiver flange.

Similarly, remove four sealing gaskets from the slots of the receiver flanges in the c onnection with the intake pipe.

Install new gaskets and the receiver in reverse order. After hand-threading the receiver mounting bolts, tighten them to the specified torque (see “Appendices”, p. 315) in the following sequence: first the five front mounting bolts (evenly from the center outward) and then the two rear mounting bolts.

Removing the fuel tank

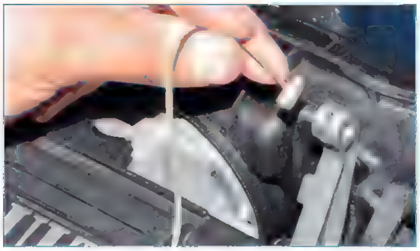
The procedures for removing the fuel tank on a vehicle with the 1.6 (16V) engine are the same as those for removing the fuel tank on a vehicle with a 1.4–1.6 (8V) engine (see " Removing the fuel tank", p. 120).

Removing the evaporative emissions canister

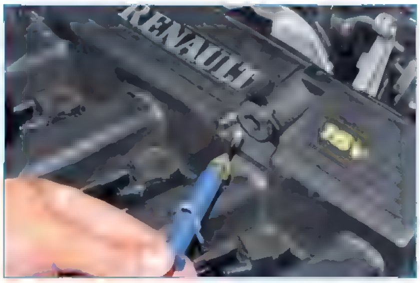
The procedures for removing the evaporative emissions canister on a vehicle with the 1.6 (16V) engine are the same as those for removing the canister on a vehicle with a 1.4–1.6 (8V) engine (see "Removing the evaporative emissions canister", p. 121).

Throttle cable replacement

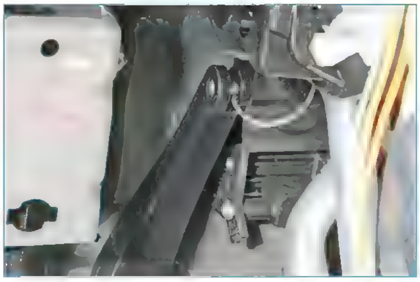
Replace the throttle cable when it sticks (the cable is difficult to move inside its sheath) caused by a break in some wire strands and their fraying, as well as when the cable is broken.



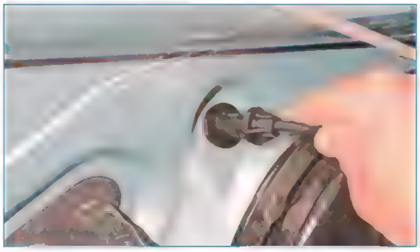
Pressing the throttle drive lever, disconnect the cable end from it.



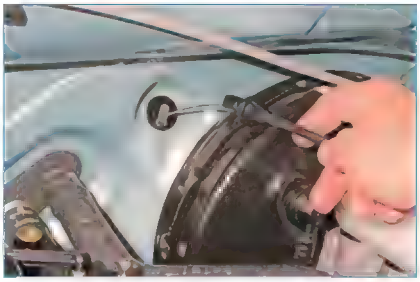
Remove the cable sheath tip from the plastic bracket on the intake pipe. In the vehicle interior under the instrument panel...



...withdraw the cable end from the hole in the accelerator pedal by passing the cable through the slot in the pedal. In the engine compartment, pry the cable sheath bushing with a slotted screwdriver...



...we pull the grommet out of the seal in the front bulkhead.

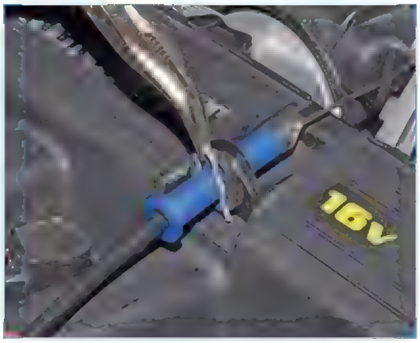


Pull the cable end out of the seal in the front bulkhead.

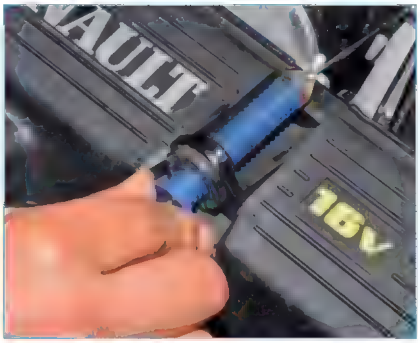
After pulling the cable out of the holder on the battery tray, we remove the cable.
Install the new throttle cable in the reverse order. After installation, the drive must be adjusted.

With the accelerator pedal fully released, the throttle valve must be fully closed, and with the pedal pressed to the floor, the throttle valve must be fully open. The throttle drive lever must not have any extra play.

For adjustment и пр of the drive...



...using pliers we remove the retainer of the upper end of the cable sheath...

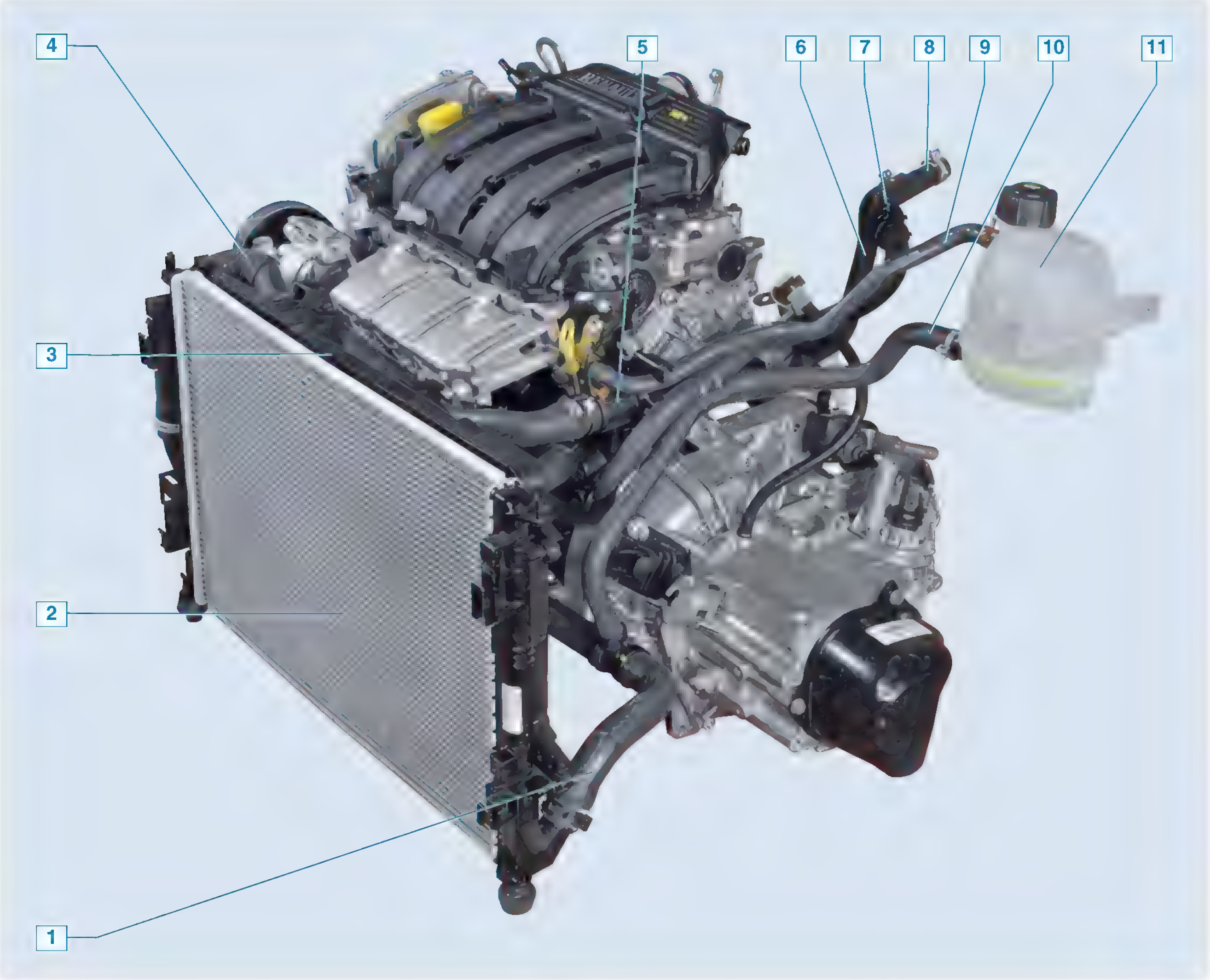


...and, after moving the end piece in the plastic bracket of the intake pipe to the required position, we insert the retainer into the annular groove on the end piece.

By pressing the accelerator pedal several times, we make sure that the throttle valve opens and closes fully and without sticking.

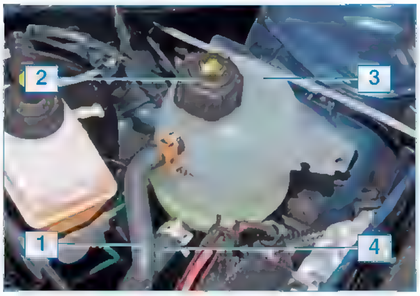
Engine cooling system 1.6 (16V)

Description of the design



Engine cooling system: 1 – radiator outlet hose; **2** – radiator; **3** – fan shroud; **4** – radiator inlet hose; **5** – thermostat housing; **6** – heater radiator outlet hose; **7** – air bleed nipple; **8** – heater radiator inlet hose; **9** – vapor return hose; **10** – filler hose; **11** – expansion tank

The cooling system is liquid, closed-type, with forced circulation. It consists of an expansion tank, a coolant pu mp, the engine cooling jacket, a thermostat, connecting hoses, and a radiator with an electric fan. The heater radiator is connected to the cooling system. The cooling system is filled with coolant through the expansion tank filler neck. The expansion tank is made of translucent plastic, which allows visual monitoring of the coolant level. The wall of the expansion tank is marked with MAX and MIN marks, between which the fluid level should be when the engine is cold. A vapor-return hose connecting to the upper fitting of the tank is attached,



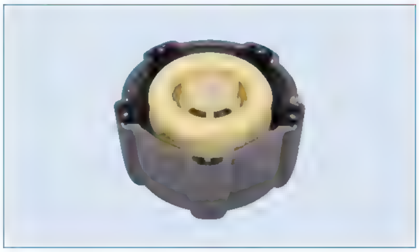
Expansion tank components: 1 – vapor relief hose; **2** – filler neck cap; **3** – tank; **4** – filler hose

reservoir with thermostat cap. The filler hose of the expansion tank and the radiator outlet hose connect to the pump's inlet pipe.

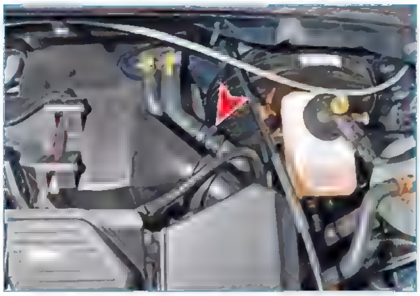
The cooling system's tightness is ensured by the inlet and outlet valves in the expansion tank cap.

The outlet valve maintains elevated pressure in the system compared with atmospheric pressure when the engine is hot. This raises the liquid's boiling point and reduces vapor losses. The inlet valve opens when the system pressure drops as the engine cools.

If the cap is lost, it must not be replaced with a sealed cap without valves, even if it fits in size and thread — this will cause an unacceptable increase in pressure in the cooling system (on a hot engine) and, as a result, leakage of coolant from the hose clamps.



Expansion Tank Cap



Bleeder Nipple for Releasing Air from the Cooling System

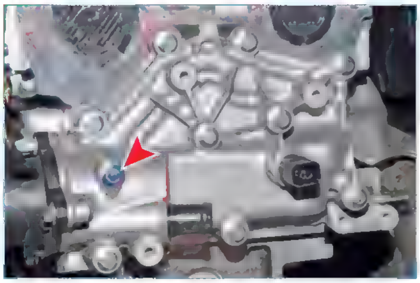
There is a fitting on the hose supplying fluid to the heater, and a bleed plug on the thermostat housing for releasing air from the cooling system when filling it with fluid. The fitting on the hose is covered with a cap.

Circulation of the coolant in the cooling system is provided by the coolant pump. The coolant pump is a bladed, centrifugal type driven by the timing belt from the crankshaft toothed pulley. It consists of a housing, a bearing assembly with a seal, an impeller, and a toothed pulley.

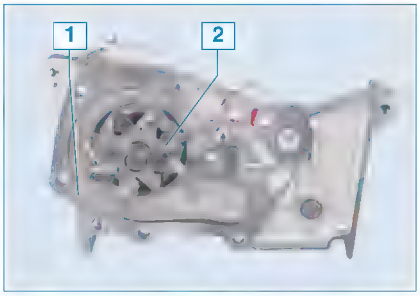
The fluid flows to the pump through the supply pipe located on the front wall of the cylinder block, under the protection of the fuel rail.

From the pump, the fluid is pressurized into the engine cooling jacket, and from there to the thermostat housing.

The thermostat helps speed up engine warm-up, automatically maintain its thermal regime within set limits and regulates the amount of fluid passing through the radiator. Inside the thermostat a metal canister filled with a temperature-sensitive filler (wax) is installed. The canister is hermetically sealed with a rubber plug. When heated, the filler melts and expands, compressing the plug. The rubber plug deforms, causing the diaphragm to flex and move the rod that controls the thermostat valve.



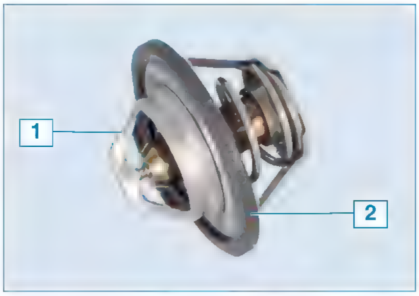
Plug on the Thermostat Housing for Releasing Air from the Cooling System



Coolant Pump: 1 – housing; **2** – impeller

On a cold engine the thermostat valve is closed and blocks the outlet leading to the cooling system radiator. In this state all the fluid goes through the thermostat housing into the heater core, bypassing the cooling system radiator, and returns to the pump — the short circulation loop. As the engine warms up, at a coolant temperature of 89 °C the thermostat valve begins to move, allowing coolant flow to the cooling system radiator. At a temperature of 95±2 °C the thermostat valve fully opens and the fluid flows into the cooling system radiator, where it releases heat to the surrounding air.

The flow of coolant through the engine cooling jacket and the cooling system radiator forms a large circulation loop. Coolant circulates through the heater core continuously and is not affected by the position of the thermostat valve. The cooling system radiator consists of two vertically arranged...



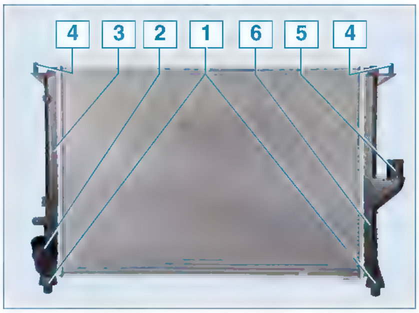
Thermostat: 1 – thermostat; **2** – sealing ring

Nested plastic tanks connected by aluminum tubes to cooling fins. The fluid enters the radiator through the inlet in the right tank and exits through the outlet in the left tank. The radiator has no drain opening.

An electric fan is mounted in a shroud behind the radiator. As the coolant temperature rises, the fan is activated on command from the engine electronic control unit (ECU) through a relay.

Lower mounting rubber pad of the radiator

On vehicles equipped with air conditioning, an additional resistor is installed on the fan shroud. When the coolant temperature rises or the air conditioner is switched on, the ECU engages the fan through the additional resistor and the fan runs at low speed. With a further increase in coolant temperature and when the refrigerant pressure exceeds the threshold level, the ECU switches the motor on bypassing the resistor, and the fan runs at high speed.

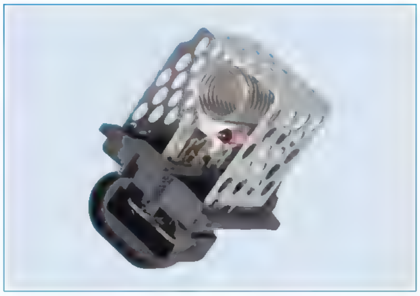


Radiator: 1 – lower mounting rubber pad; **2** – outlet pipe; **3** – left tank; **4** – upper mounting pin;**5** – inlet pipe; **6** – right tank

The fan turns on at low speed when the coolant temperature exceeds 99 °C and turns off when the temperature drops to 96 °C.

The fan turns on at high speed when the coolant temperature exceeds 102 °C and turns off when the temperature drops to 98 °C.

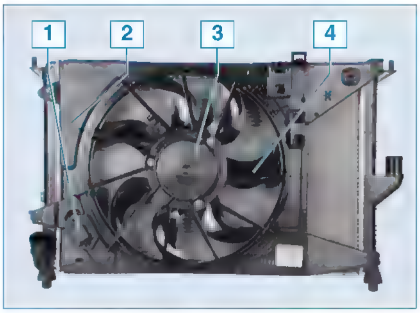
If the coolant temperature exceeds 118 °C, the engine overheating indicator in the instrument cluster will light up.



Additional fan resistor

Engine coolant temperature sensor

If, after the ignition is switched off, the coolant temperature exceeds 103 °C, the fan will continue to run at low speed for five minutes. After the temperature of the fluid drops below 100 °C, the fan switches off.



Cooling system fan assembly with radiator: 1 – additional resistor; **2** – shroud; **3** – electric motor; **4** – fan blade

The coolant temperature sensor is screwed into the thermostat housing (see “Removing the coolant temperature sensor,” p. 157).

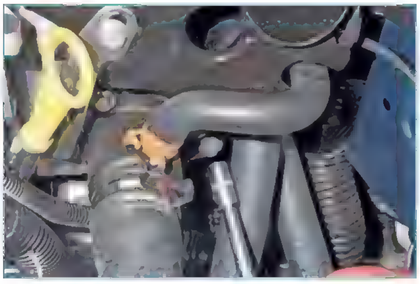
The sensor provides information to the temperature gauge in the instrument cluster, the engine overheating indicator, and the engine management electronic control unit.

Removal and inspection of the thermostat

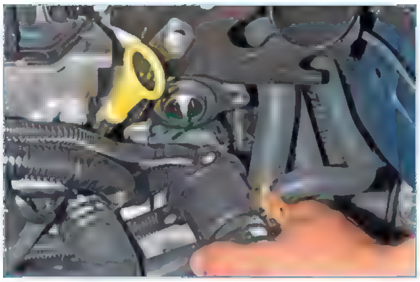
The thermostat should be replaced if the engine’s thermal regime is disturbed, causing the engine to either overheat or fail to reach operating temperature.

When checking the thermostat on the vehicle after starting a cold engine, the lower radiator hose leading away from the radiator should remain cold for some time and then, once the coolant temperature reaches 89 °C, quickly

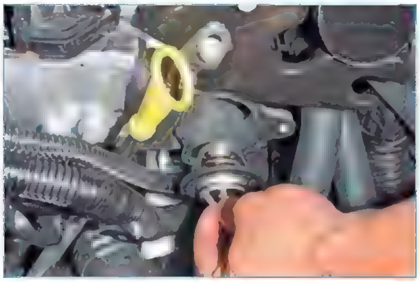
It starts to heat up, indicating the beginning of coolant circulation through the long loop.
To remove the thermostat, drain the coolant (see “Engine coolant replacement 1.6 (16V)”, p. 46).
Without disconnecting the hoses from the thermostat housing...



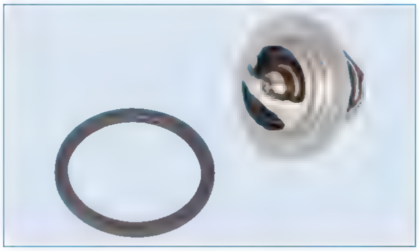
...using a 10 mm wrench, loosen the three bolts securing the thermostat cover...



...and pull it away from the thermostat housing.

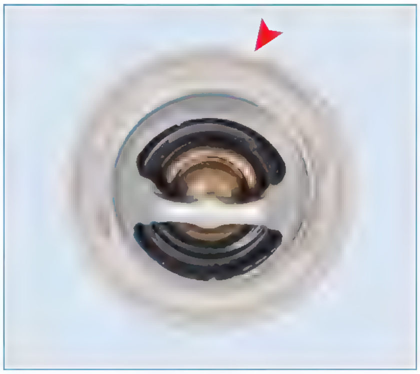


Remove the thermostat from the housing.



The thermostat is sealed to the cover with a rubber gasket.

If the gasket is damaged or has lost its elasticity, it must be replaced with a new one.
To test the thermostat, immerse it in a vessel with coolant. Heat the vessel while stirring the coolant and watch the thermometer to detect when the valve begins to open. The valve stem should begin to extend at 89 °C...



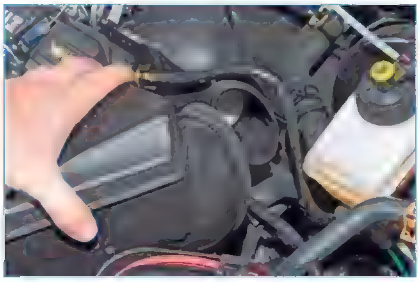
...indicated by the number "89"
on the thermostat flange

At 95±2 °C the valve should be fully open – stem travel not less than 8 mm.
Reinstall the thermostat in the reverse order.
Fill the cooling system with coolant and bring the fluid level in the reservoir up to the specified mark (see “Engine Coolant Replacement 1.6 (16V)”, p. 46).

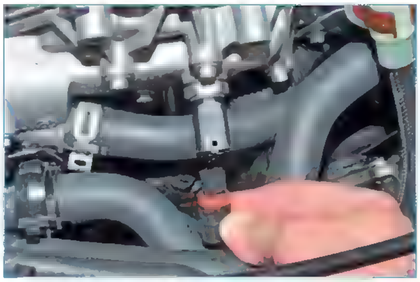
Removing the thermostat housing

Remove the thermostat housing if you detect coolant leakage at the joint between the mating surface of the cylinder head and the thermostat housing flange.

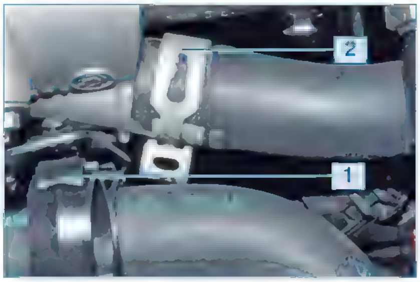
Drain the coolant (see “Engine coolant replacement 1.6 (16V)”, p. 46).
Remove the air intake (see " Removing the air intake," p. 165)...



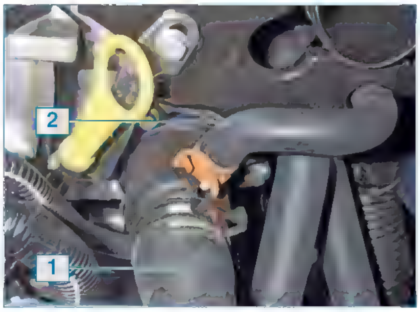
...and remove the resonator.



Disconnect the wiring connector from the engine coolant temperature sensor (see " Removing the engine coolant temperature sensor," p. 157).

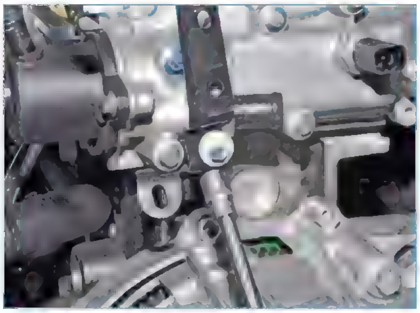


Overcoming the resistance of the retainers, pull the hose holder 1 of the cooling system out of the bracket holes. Squeeze the ends of clamp 2, slide the clamp along the hose, and remove the heater hose from the thermostat housing pipe.

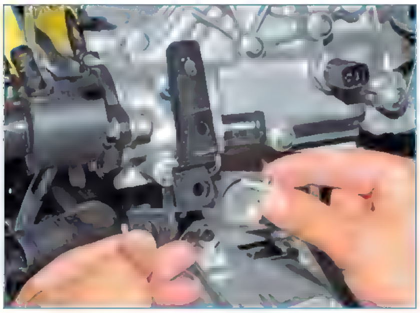


Similarly, disconnect the supply hose from the thermostat cover pipes

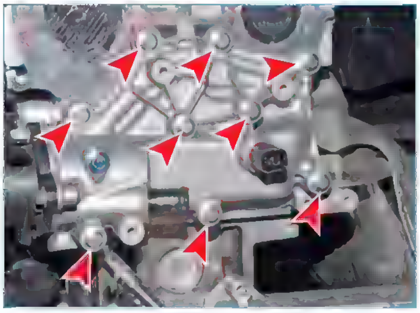
radiator hose 1 and steam relief hose 2.



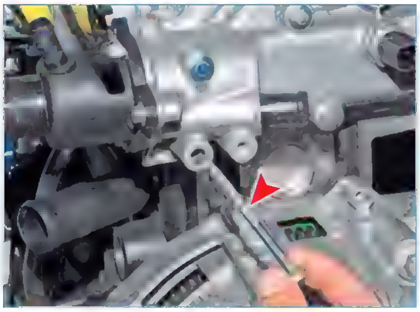
Using a 10 mm socket, loosen the bolt that secures the hose bracket...



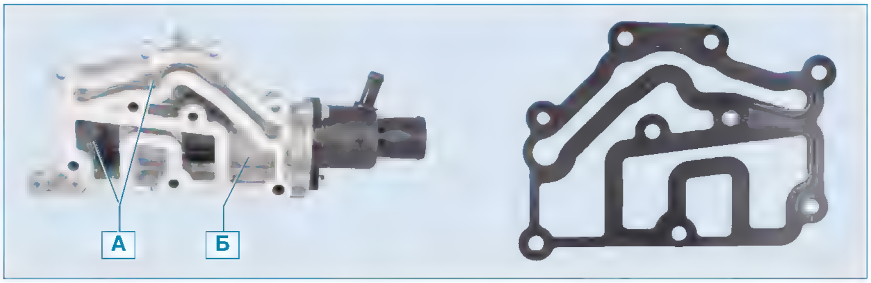
...and remove it.



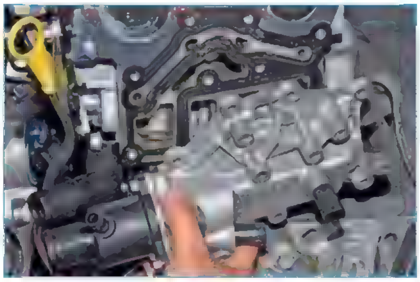
Using an 8mm socket, loosen the nine bolts securing the thermostat housing to the cylinder head.



The bolt indicated by the arrow is the longest of the nine bolts.



Thermostat housing with gasket: A – oil chambers; **B** – cooling chamber for щей fluid



Separate the pump housing from the gasket and remove it.

Remove the gasket.
Note that there are oil and coolant passages in the housing and gasket (see photo above).

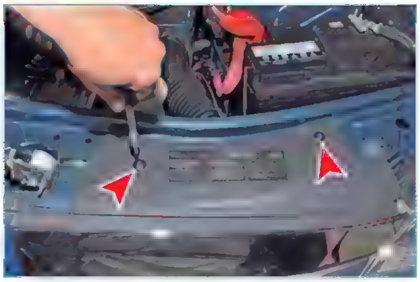
Replace the damaged gasket with a new one.
Install the thermostat housing in the reverse order.
Pour coolant into the cooling system and bring the fluid level in the reservoir up to the correct mark (see “Engine coolant replacement 1.6 (16V)”, p. 46).

Removing the radiator fan

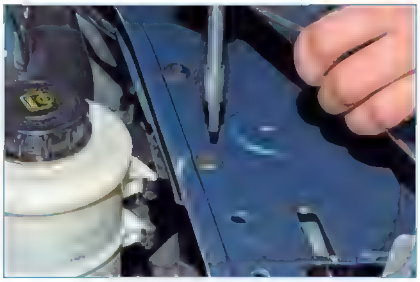
Remove the fan for replacement, and also when removing the radiator of the engine cooling system and the condenser of the air conditioning system.
Perform the work on a service pit.
on a ramp or overpass.
The work is demonstrated on a vehicle with power steering.

Disconnect the cable terminal from the battery's negative post.

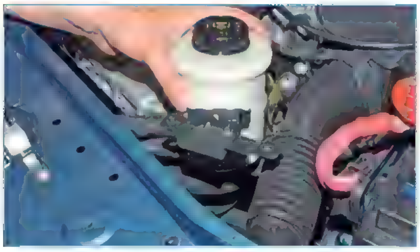
Remove the engine undertray (see “Removing the engine undertray,” p. 283).



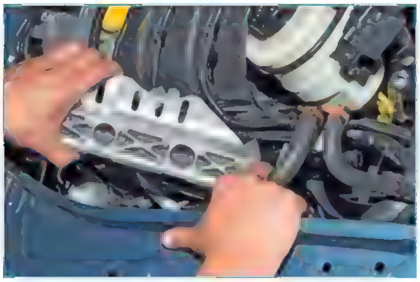
Use a Torx T-30 wrench to loosen the two screws securing the front bumper to the upper crossmember of the radiator support.



Bending back the upper right section of the front bumper, use the same tool to unscrew the two mounting screws of the power steering fluid reservoir bracket...



...and, without disconnecting the hoses from the reservoir, move the bracket with the reservoir away from the upper crossmember of the radiator frame.



Remove the fuel rail shield (see " Removing the fuel rail shield," p. 138).

The remaining procedures are similar to those for removing the fan

on the 1.4–1.6 (8V) engine (see " Removing the radiator fan," p. 126).

Removing the radiator

Remove the radiator to check it for leaks (if a leak is suspected) or to replace it if damaged.

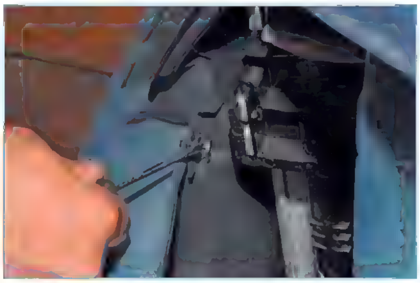
Perform the work over an inspection pit or on a service ramp. Remove the front bumper (see “ Removing the front bumper on the Logan,” p. 286; “Removing the front bumper on the Sandero and Sandero Stepway,” p. 287). Drain the coolant (see “Replacing the engine coolant 1.6 (16V),” p. 46).

Remove the radiator fan (see “ Removing the radiator fan,” p. 174).

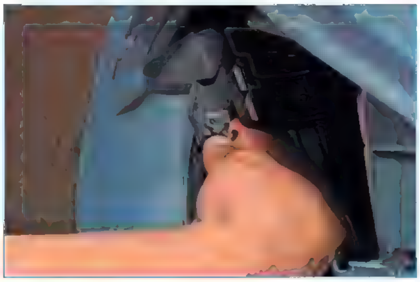
To gain access to the fasteners for the deflector...

fasteners of the deflector...

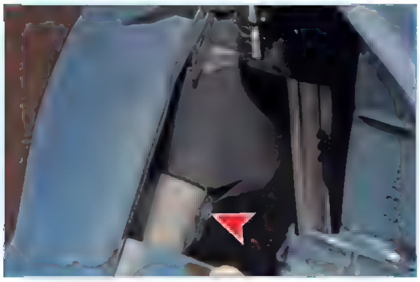
to remove the fascia, we take off both headlight assemblies (see “Removing the headlight assembly on the Logan,” p. 256; “Removing the headlight assembly on Sandero and Sandero Stepway,” p. 258).



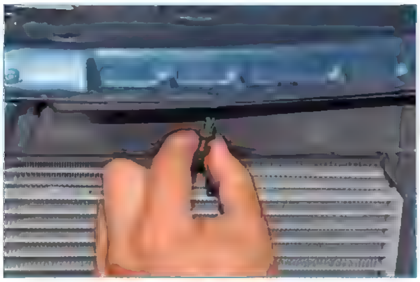
Use a screwdriver to slide the retainer of the left upper push rivet securing the radiator deflector to the upper crossmember of the radiator...



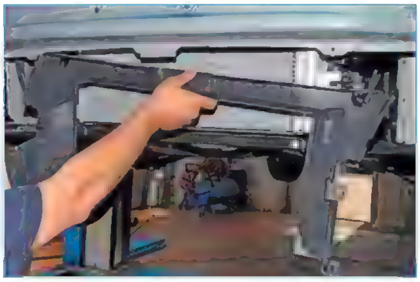
...and pull the rivet out of the hole. Remove the right upper deflector push rivet in the same way...



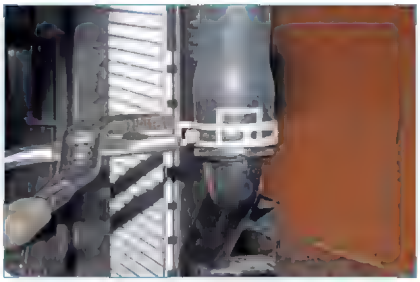
...and the two lower ones — one on each side.



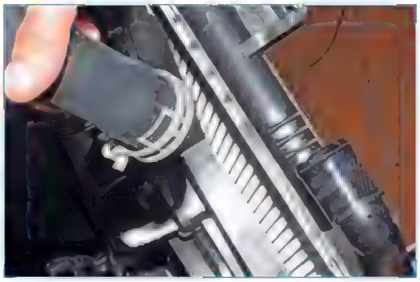
Using the same method, remove the rivet located behind the radiator trim...



...and remove the radiator deflector.



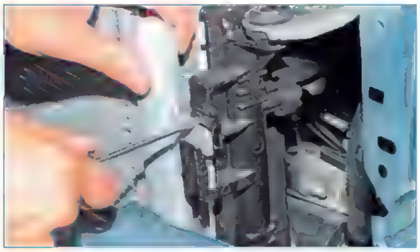
Use slip-joint pliers to compress the clamp securing the supply hose...



...and we remove the hose from the radiator fitting.

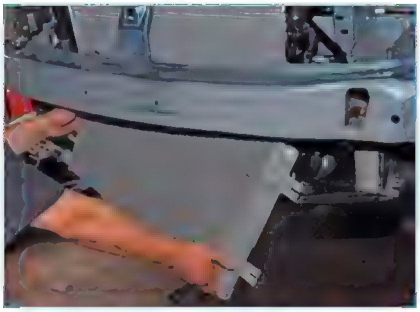
The air conditioning condenser is mounted on plastic
tabs molded as one piece with the plastic
radiator tanks.

To remove the condenser without disconnecting the refrigerant supply and return lines...

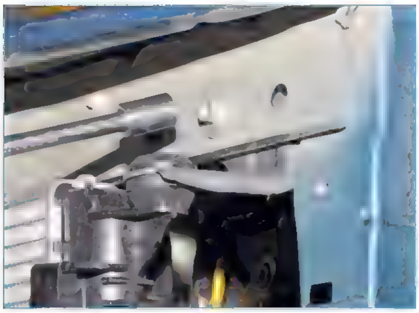


...use a screwdriver to press the retainer of the condenser's upper bracket and the lower one (not visible in the photo).

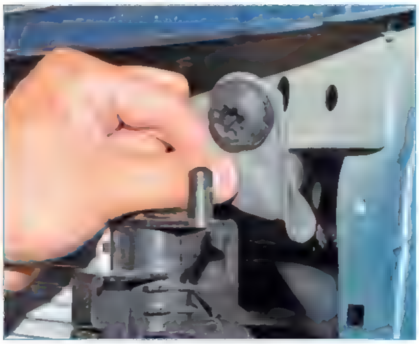
Raise the left side of the condenser slightly so that the bracket clips remain in their compressed position.
Perform the same operations on the right side of the condenser, then lift the condenser, freeing its brackets from the radiator tabs...



...and carefully lower the condenser to the floor, taking care not to damage the connecting tubes.



Use a 10 mm socket to loosen the bolt securing the left bracket of the radiator's upper mount...

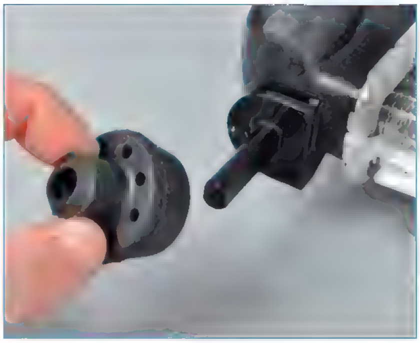


...and remove the bracket with its rubber pad from the pin on the radiator's left tank.
Similarly, remove the right bracket from the pin of the right tank of the radiator—

ator.

Lift the radiator so that the rubber pads of the lower mounting come out of the holes in the crossmember of the subframe...

...and pull it out downward.



Remove the rubber lower radiator mounting cushions from the radiator pins.
If necessary, remove the rubber cushions from the upper mounting brackets. Replace any cushions that are cracked or have lost their elasticity.
Check the radiator for leaks in a water bath. Plug the radiator hoses with wooden stoppers, apply compressed air at about 0.1 MPa (1 kgf/cm^2) to it through one of the stoppers, and submerge the radiator in the water bath for at least 30 seconds. No air leakage (bubbles) should be observed. Replace a leaking radiator with a new one.

Reinstall the radiator in reverse order.
If the rubber pads of the lower radiator mount came off together with it, then when installing the radiator

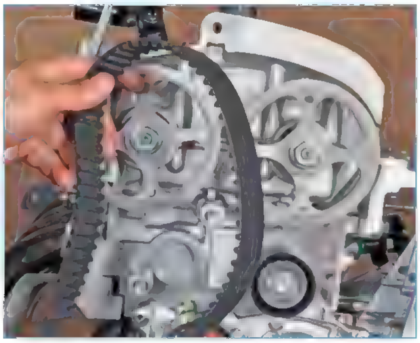
first, insert the cushions into the openings of the subframe.

Pour the coolant into the cooling system and bring the fluid level in the reservoir up to the normal mark (see “Engine coolant replacement 1.6 (16V)”, p. 46).

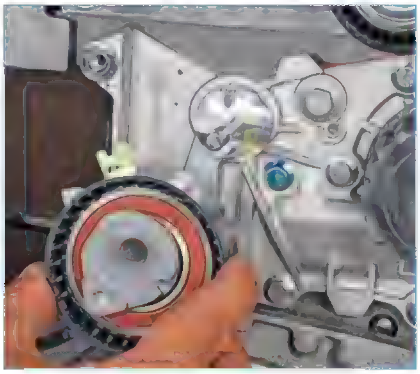
Removing the coolant pump

Replace the pump assembly if bearing noise appears, if the pulley turns stiffly with the drive belt removed, if there is excessive radial play in the pump shaft, or if coolant leaks from the inspection hole.

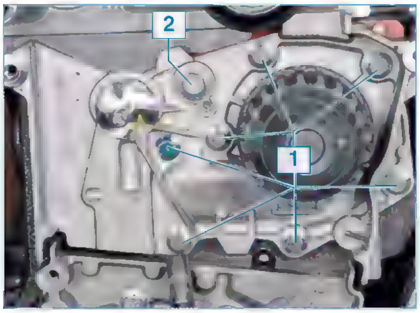
Drain the coolant (see “Engine coolant replacement 1.6 (16V)”, p. 46).



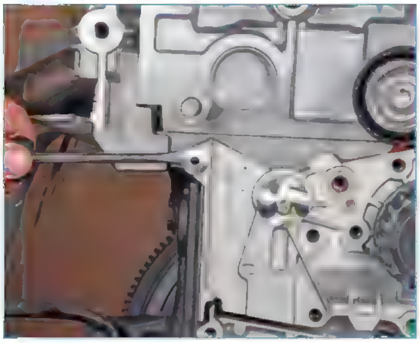
Removing the timing belt...



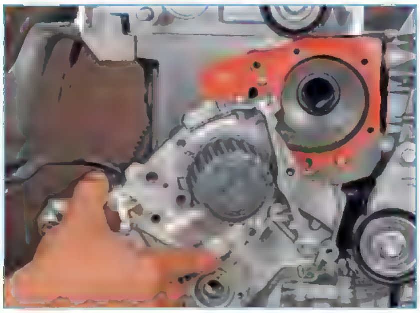
...and the tensioner pulley (see “ Checking condition and replacing the timing belt for the 1.6 (16V) engine”, p. 42).



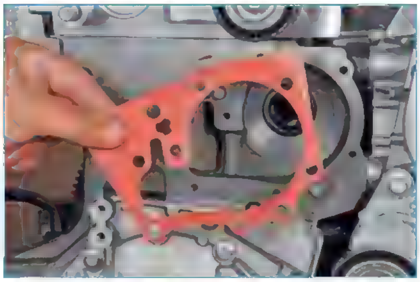
Using an 8 mm socket, loosen the seven bolts 1, and with a 10 mm socket loosen the single bolt 2 that secures the pump to the engine block.



Prying at the pump housing lip with a slotted screwdriver, pry the pump away from the engine block...

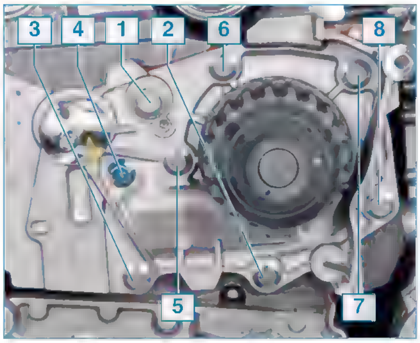


...and remove the coolant pump.



Remove the sealing gasket. Install a new sealing gasket.

Install the coolant pump in reverse order. Tighten the pump mounting bolts to the specified torques.



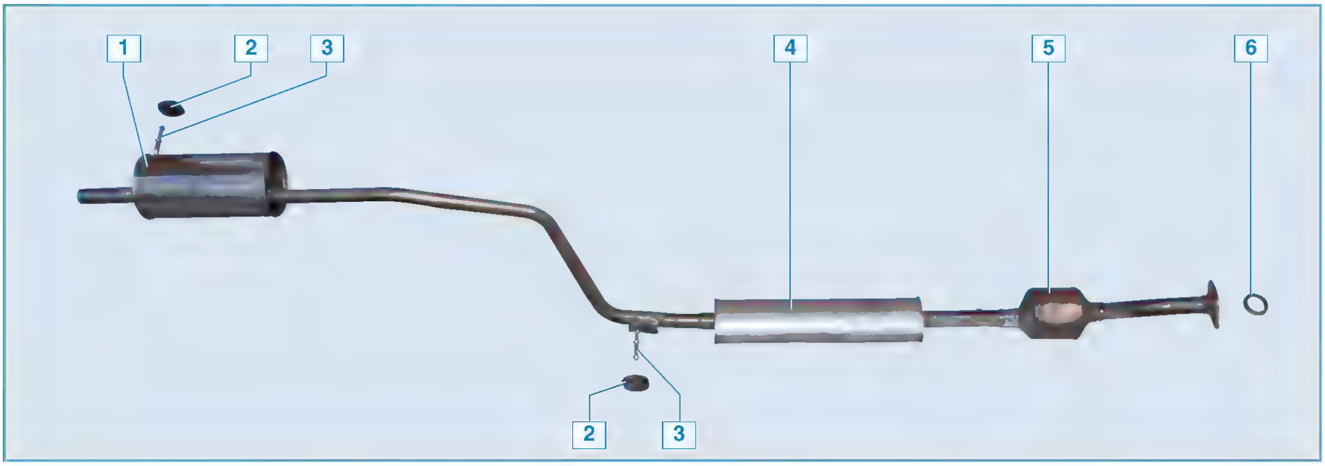
Tightening sequence for the coolant pump mounting bolts

Removing the expansion tank

The procedure for removing the coolant expansion tank on the 1.6 (16V) engine is similar to that for removing the coolant tank on the 1.4–1.6 (8V) engines (see “ Removing the expansion tank,” p. 129).

Exhaust system of the 1.6 (16V) engine

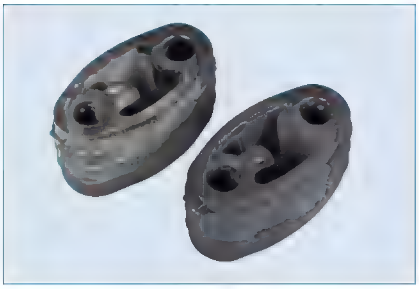
Design description



Exhaust system: 1 – main muffler; **2** – exhaust system hanger cushion; **3** – system hanger bracket; **4** – auxiliary muffler; **5** – catalytic converter; **6** – sealing ring

The exhaust system consists of the exhaust manifold, the inlet pipe with a catalytic converter for exhaust gases, the auxiliary and main mufflers, and the pipes connecting them. All components of the system, except the exhaust manifold, are welded into a single unit. The flange of the exhaust manifold is connected by a ball joint to the flange of the inlet pipe.

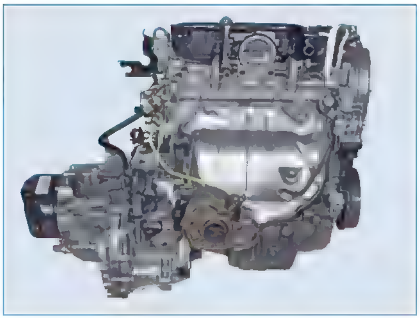
The exhaust system is mounted to the body on two rubber cushions.



Mounting cushions of the exhaust system

Heat shields are installed above the catalytic converter, the auxiliary and main silencers, and near the fuel tank.
The exhaust manifold is fastened to the head studs with nine nuts.

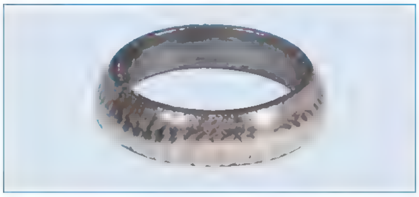
A metal sealing gasket is installed between the exhaust manifold and the cylinder head.



The exhaust manifold is covered with a heat shield (shown on a removed engine for clarity)

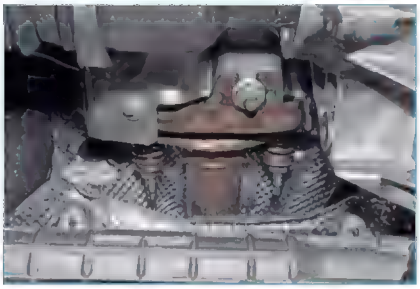
The flange of the intake pipe is attached to the exhaust manifold flange on two studs.
To seal the ball joint between the exhaust manifold and the inlet pipe, a ring made of composite material with a spherical outer surface is fitted onto the exhaust manifold flange, while the inlet pipe flange has an internal spherical surface.

Metal sealing gasket between the exhaust manifold and the cylinder head



Sealing ring with a spherical surface

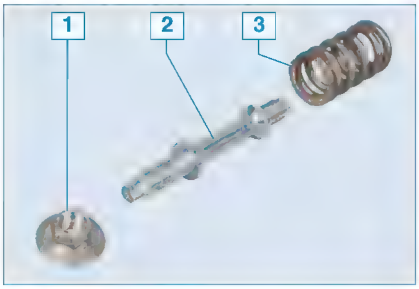
The flange connection is tightened with two nuts and cylindrical springs fitted onto the studs of the exhaust manifold.



Connection of the intake pipe to the exhaust manifold

A control oxygen concentration sensor (lambda sensor) is installed in the lower part of the exhaust manifold. A second oxygen concentration sensor — a diagnostic one — is installed in the pipe after the catalytic converter.

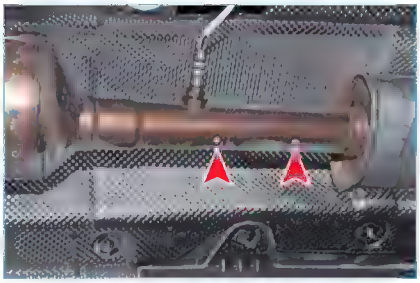
The catalytic converter is designed to reduce emissions into the atmosphere of carbon monoxide, nitrogen oxides, and unburned hydrocarbons.



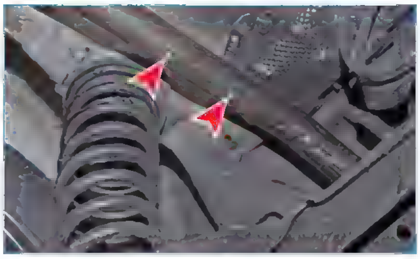
Connection parts of the intake pipe and exhaust manifold: 1 – nut; 2 – stud; 3 – spring

The catalytic converter is a porous structure coated with oxidation catalysts: rhodium, palladium, and platinum. As exhaust gases pass through the pores, carbon monoxide is converted into carbon dioxide, unburned hydrocarbons into water vapor, and nitrogen oxides are reduced to harmless nitrogen. In a functioning converter, the gas purification efficiency reaches 90–95%.

For the proper operation of the converter, the composition of the exhaust gases (in particular their oxygen content) must remain within strictly specified limits. If lead compounds are present in the exhaust gases, the catalytic converter and the oxygen sensor will quickly fail. Therefore, operating the vehicle on leaded gasoline is strictly prohibited, even briefly. A faulty ignition or fuel system can also cause converter failure. During misfires, unburned fuel entering the converter burns there and sinters the catalyst block, which can lead to blockage of the exhaust system and engine stalling (or severe power loss). Mufflers and the catalytic converter are non-serviceable units and must be replaced with new ones if they fail. Replacement parts are supplied as a converter with inlet pipe, an additional and the main muffler with pipes of a specified length, as well as special clamps for connecting the pipes. To replace an individual element of the single system, marks (punches) have been applied in two places on its pipes, indicating where the pipes can be cut.

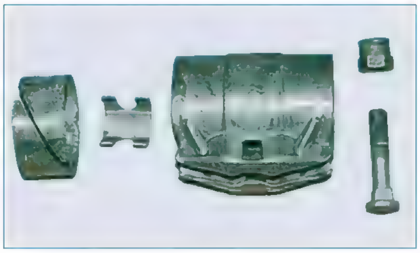


Location of marks on the pipe between the catalytic converter and the auxiliary muffler



Location of marks on the pipe between the auxiliary and main mufflers

Servicing the exhaust system consists of periodic inspections, checking the tightness of connections and for through corrosion, and includes retightening loose connections and replacing the rubber suspension hangers.



Connect the pipes of the new assembly to the exhaust system pipes using a special clamp

Replacement of the exhaust system suspension hangers

The procedures for replacing the exhaust system mounting cushions on the 1.6 (16V) engine are similar to the procedures for replacing the exhaust system mounting cushions on the 1.4–1.6 (8V) engines (see “Replacement suspension mounts of the exhaust gas system», p. 132).

Removal exhaust gas system

If one of the mufflers has burned through, the catalytic converter fails, or they have suffered major mechanical damage, the entire assembly is replaced as a unit.

Spare parts also include individual components of the exhaust system. To replace them, the damaged section must be cut out and replaced with a new one (see “Design Description,” p. 178 and “Replacement of Exhaust System Components,” p. 180).

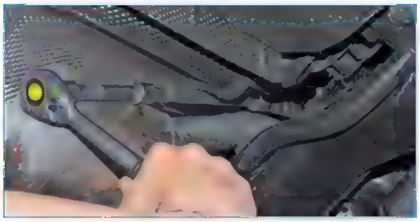
Work is performed on an inspection pit or a ramp.

To avoid burns, it is recommended to begin work after the exhaust system has cooled down.

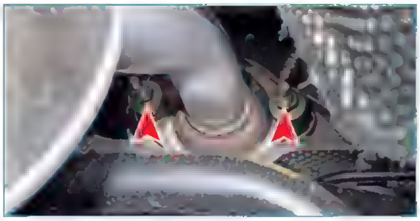
To remove exhaust system parts from the space between the body and the rear suspension beam, raise the rear of the vehicle.

Remove the two rubber exhaust system suspension cushions from the body brackets or from the exhaust system brackets one by one (see “Replacing the exhaust system suspension cushions,” p. 132).

Disconnect the wiring connector of the diagnostic oxygen concentration sensor from the connector of the engine management system wiring harness (see "Removing the oxygen concentration sensors", p. 159).

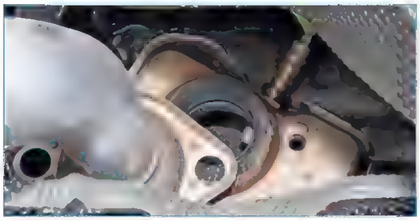


Using a 14 mm deep socket with an extension and a universal joint, unscrew the two nuts securing the inlet pipe flange to the exhaust manifold flange.



Location of the nuts securing the flange of the front pipe and the exhaust manifold.

Removing the springs from the studs (in this case the nut came off together with the stud).



Separate the flange of the front pipe from the flange of the exhaust manifold...

...and remove the sealing spherical ring from the exhaust manifold flange.

If the ring is cracked or the sealing spherical surface is damaged, replace the ring with a new one. Slide the exhaust system backward...

...and passing the exhaust system parts between the rear suspension beam and the vehicle floor...

...remove the exhaust gas system components.

Reinstall the exhaust system in reverse order.

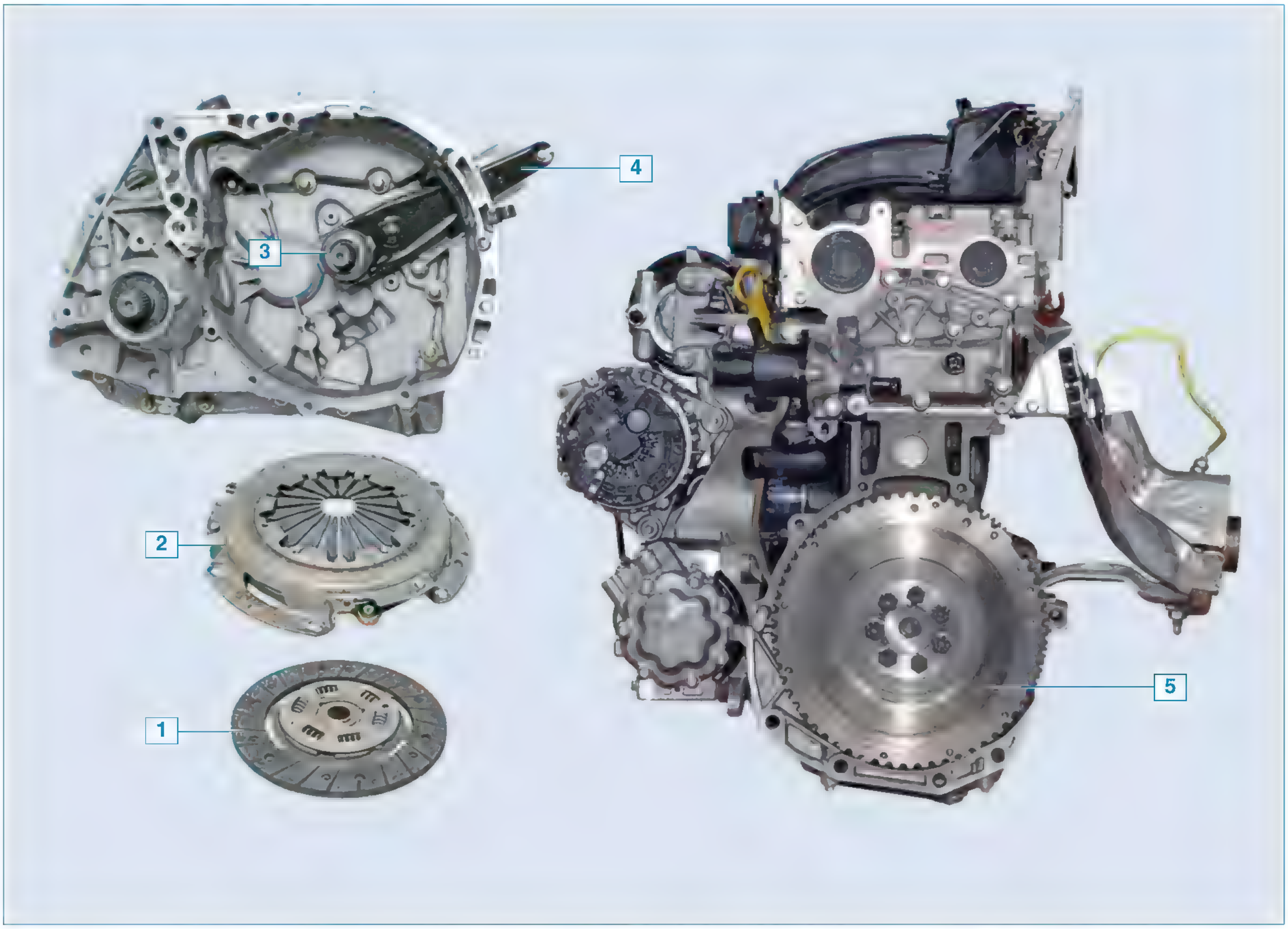
If the nuts came off together with the studs when disconnecting the flanges of the intake pipe and the exhaust manifold, screw the studs back into their original positions before installing the exhaust system.

Replacement of exhaust system components

The procedures for replacing components of the 1.6 (16V) engine’s exhaust system are similar to those for replacing components of the 1.4–1.6 (8V) engine’s exhaust system (see “Replacement of exhaust system components,” p. 133).

Clutch

Description of the design



Clutch components of Logan and Sandero vehicles: 1 – driven disc; **2** – pressure plate with cover assembly ("basket");**3** – clutch release bearing with coupling assembly; **4** – clutch release fork; **5** – flywheel

The clutch is a single-plate, dry type with a central diaphragm spring. The mechanism is housed in an aluminum housing structurally integrated with the gearbox and attached to the engine cylinder block.

The clutch housing is attached to the engine flywheel with six bolts. Three dowel pins are pressed into the flywheel; when the clutch is fitted, they enter the corresponding holes in the housing, centering it. A diaphragm spring is installed in the housing. Stamped from sheet spring steel, the diaphragm spring in its free state has the shape of a truncated cone with radial slots running from the inner edge of the spring. The spring slots form eighteen fingers that act as resilient release levers. Due to the elasticity of these levers, the diaphragm spring provides a more even

It applies pressure to the clutch pressure plate and helps provide smoother engagement and disengagement of the clutch. At three points, the housing is connected to the pressure (driven) plate by resilient steel plates. This assembly (also called the clutch "basket") is balanced as a unit on a test bench and therefore is replaced as a whole. The basket must be replaced if the ring wear on the diaphragm spring fingers exceeds 0.8 mm in depth.

and also in the event of a reduction in pedal force when the clutch is disengaged (and, consequently, an increase in pedal travel), which indicates heavy wear of the pressure plate surface or spring "settling."

The driven disc with a torsional vibration damping spring is located on the splines of the gearbox input shaft between the flywheel and the pressure plate. It provides an elastic connection between the clutch driven disc and the gearbox input shaft. It damps torsional vibrations that arise from dynamic loads in the drivetrain and from uneven engine operation. Two friction linings of the disc are riveted on both sides to a spring plate, which in turn is riveted to one of the two damper plates. A hub for the disc is installed between the damper plates. Damper springs are installed in the holes of the hub and the damper plates. The damper plates are connected by three support pins. There are cutouts in the disc hub opposite the support pins that allow the hub to rotate within certain limits relative to the damper plates, compressing the damper springs while doing so. This reduces dynamic loads in the drivetrain when starting the vehicle and when shifting gears. The outer diameter of the driven disc for a vehicle with a 1.4 L engine is 180 mm, for a 1.6 L engine — 200 mm, and the disc thickness is 7.6 mm. The driven disc is replaced if its axial runout in the area of the friction linings exceeds 0.5 mm, or if there is oil contamination, cracking, scoring, or uneven lining wear, loosening of riveted joints, or if the rivet heads are countersunk less than 0.2 mm below the lining surface.

Elements of the clutch actuation mechanism: 1 – clutch housing; **2** – guide sleeve for the clutch release bearing; **3** – clutch release bearing with coupling assembly; **4** – clutch release fork; **5** – dirt protection cover

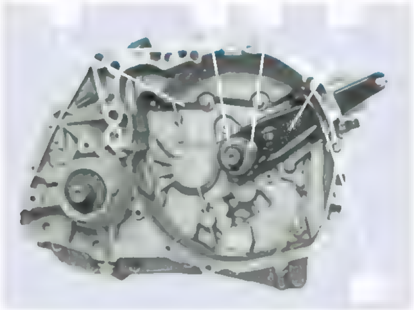
“Clutch housing” (pressure plate with cover assembly): 1 – clutch cover; **2** – pressure plate; **3** – diaphragm spring; **4** – connecting plate

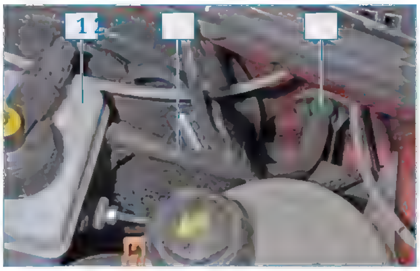
Driven clutch disc: 1 – rivet of the friction lining; **2** – friction linings; **3** – spring plate;**4** – support pin; **5** – disc hub;**6** – damper spring; **7** – damper plate

The clutch actuation on **Logan** and **Sandero** vehicles is cable-operated and free-play–free. The front end of the cable is secured in the clutch release fork, and the rear end is in the clutch pedal holder. The front end is threaded and used to adjust the clutch release mechanism. The clutch pedal is mounted on a pivot in the pedal assembly bracket. The pedal return spring is fitted on the same pivot. The fork pivots on a ball joint installed in the clutch housing. A clutch release bearing is installed between the release fork and the diaphragm spring fingers. The bearing hub has two hooks that engage the ears of the fork. The clutch uses a driven-spring arrangement in which the bearing is held constantly against the diaphragm spring fingers. The bearing slides freely on a guide sleeve pressed into the clutch housing.

Disengagement of the clutch occurs as follows. When the clutch pedal is depressed, the cable rotates the clutch release fork, which moves the bearing along the guide sleeve. The bearing presses on the fingers of the diaphragm spring. As the spring deforms, it ceases to press the pressure plate against the flywheel, causing the pressure plate to move away from the flywheel, whereupon the engine crankshaft and the transmission input shaft are able to rotate independently of each other. When the pedal is released

Clutch cable: 1 – front cable end; **2** – front cable sheath end; **3** – rear cable end; **4** – rear cable sheath end; **5** – cable; **6** – rubber support bushing





Components of the clutch hydraulic drive of the Sandero Stepway: 1 – reservoir of the master brake cylinder and the clutch cylinder; **2** – fluid supply tube to the clutch master cylinder; **3** – clutch master cylinder

When the clutch pedal is released, the release bearing returns to its original position, allowing the diaphragm spring to press on the pressure plate again, which in turn clamps the driven plate to the flywheel — restoring the transmission of torque.

The **Sandero Stepway** uses a hydraulic clutch release system.

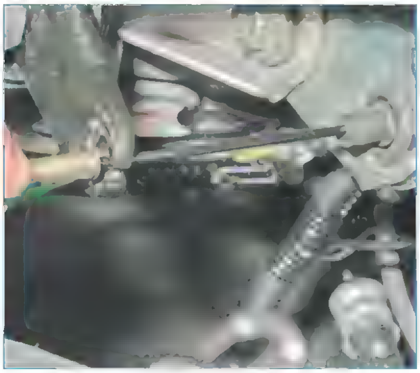
The clutch release mechanism consists of the clutch pedal, the master cylinder, the release bearing combined with the slave cylinder, and the connecting lines. The system uses brake fluid filled into a reservoir mounted on the master brake cylinder, which simultaneously supplies both the braking system and the clutch release mechanism.

The clutch master cylinder is mounted on the firewall, and the cylinder rod is connected to the pedal. A filler line runs from the reservoir on the main brake cylinder to the clutch master cylinder. When the pedal is depressed, the rod moves, creating fluid pressure in the working line that acts on the clutch slave cylinder. The slave cylinder is installed inside the clutch housing and is integrated with the release bearing. When pressure is applied, the slave piston acts on the bearing, moving it forward and thereby disengaging the clutch. A coil spring constantly keeps the release bearing pressed against the diaphragm spring of the clutch "basket." The diaphragm spring returns the bearing to its original position after pressure in the line is released. The release bearing contains a lifetime supply of grease and requires no maintenance. Because the bearing and diaphragm spring remain in constant contact, there are no clearances in the clutch mechanism, and no adjustments are provided.

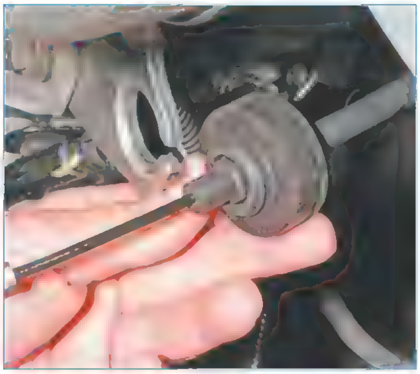
At the junction of the clutch slave cylinder with the fluid supply line, which is a steel tube, there is a bleeding fitting for the hydraulic clutch actuator.

Replacing the clutch release cable

If the cable breaks or its movement in the sheath is obstructed, replace the cable assembly.



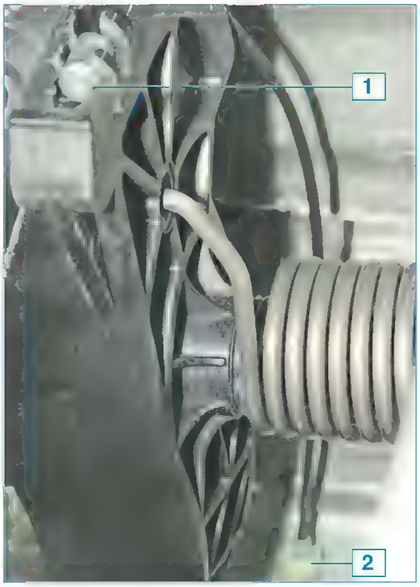
By pulling on the weight at the front end of the cable, we withdraw the cable from the slot in the clutch release fork.



Remove the cable sheath end from the bracket on the gearbox.

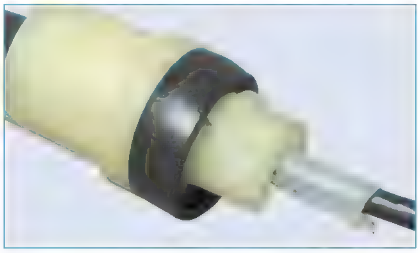
Inside the vehicle under the dashboard

pull the cable toward yourself from the instruments...

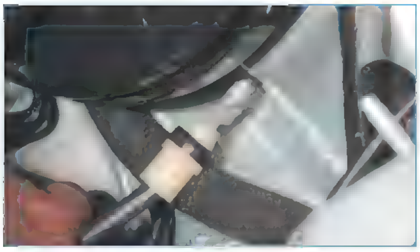


...pull the rear cable end 1 out of the pedal holder and then, squeezing the two tabs of the rear end 2 of the cable sheath...

...push the tip out of the front shield into the engine compartment.



Flanges of the rear tip of the sheath cable (shown on the removed cable for clarity).



We pull the cable into the engine compartment through the opening in the front bulkhead. Install the cable in reverse order and adjust the clutch release mechanism (see “ Checking and adjusting the clutch release mechanism,” p. 50).

Removing clutch components

Remove the bellhousing, the driven disc, and the clutch release bearing to replace them if they fail. The bellhousing and driven disc are also removed when replacing the flywheel and the rear crankshaft oil seal.

Work should be carried out in an inspection pit or on a ramp. The procedures are demonstrated on a Logan vehicle.

When replacing clutch components, it may not be necessary to fully remove the gearbox (which would require time-consuming operations to remove the subframe); it is often sufficient to pull it away from the engine by the required distance.

Disconnect the wire terminal from the negative terminal of the battery.

Remove the left wheel drive (see " Removing the front wheel drives", p. 194).

Unscrew the bolt securing the left subframe bracket to the body and loosen the nut fastening the bracket to the suspension arm (see "Removing the arm", p. 203).

Disconnect the clutch release cable from the fork of the clutch release mechanism and from the bracket on the gearbox (see “ Replacing the clutch release cable,” p. 183). Disconnect the gearbox control rod from the switch on the gearbox (see “Removing the gearbox control rod,” p. 188).

Remove the speed sensor (see “ Removing the speed sensor,” p. 110). Remove the crankshaft position sensor (see “Removing the crankshaft position sensor,” p. 106).

Disconnect the wiring connector from the reverse light switch (see " Removing the reverse light switch", p. 261).

Disconnect the engine management wiring harness connector from the connector of the oxygen sensor control harness.

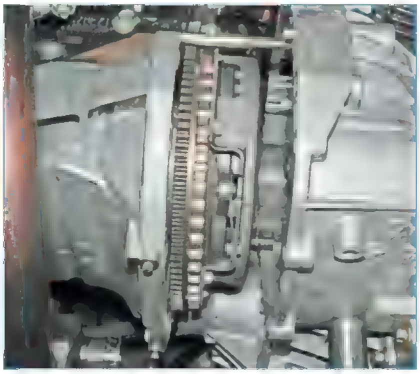
Remove the sensor connector from its holder on the transmission and pull the sensor wiring harness out of the holder on the transmission (see " Removing the oxygen sensors", p. 109).

Remove the starter (see “Removing and Inspecting the Starter”, p. 251). Release the holder on the transmission housing and pull the wiring harness out of it. Unscrew the four bolts securing the engine oil pan to the transmission (see “Removing the Transmission”, p. 189).

Place adjustable supports under the engine and transmission. Remove the rear and left engine mounts (see “Replacing Engine Mounts”, p. 96).

Disconnect the ground wires from the transmission, then loosen the bolts and nuts securing the transmission to the engine cylinder block (see “Removing the Transmission”, p. 189).

Holding the housing of the inner joint of the right wheel drive...

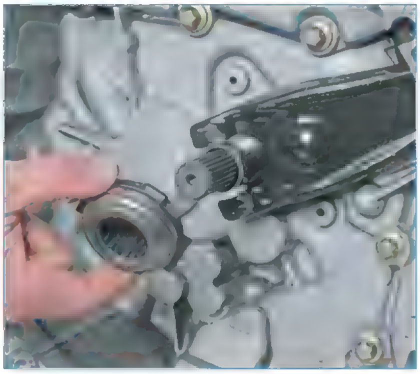


...pull the transmission away from the engine, withdrawing the input shaft from the hub of the driven clutch disc.

The splined shaft of the semi-axle gear of the differential will exit the tip of the inner joint housing of the right-wheel drive. Move the gearbox away from the engine (to a distance that allows removal of the clutch components) and support the left side of the gearbox on the subframe.

When removing and installing the gearbox, do not rest the gearbox input shaft on the fingers of the diaphragm spring, so as not to damage them.

To replace the clutch release bearing, slide it along the guide sleeve toward the end of the gearbox input shaft, withdrawing the prongs of the release fork from engagement with the bearing sleeve.

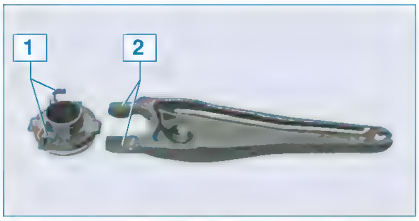


Remove the bearing (shown on the removed gearbox for clarity).

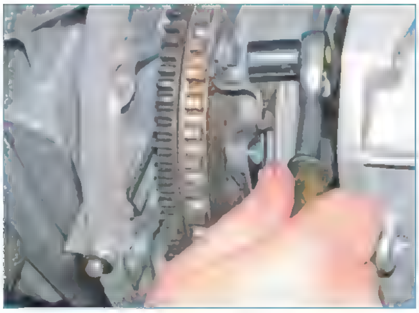
Remove the fork from the ball joint and pull the end of the fork out of the dust cover.

Before installing the bearing, apply grease to the surface of the guide bushing, the tabs of the clutch release fork, and the fork's ball joint. Replace a torn rubber boot of the clutch release fork with a new one.

Install the clutch release bearing in the reverse order.



When installing the bearing, the tabs 2 of the fork must engage the plastic hooks 1 of the bearing sleeve. With a pry bar inserted between the teeth of the flywheel ring gear and braced against the gearbox mounting stud...

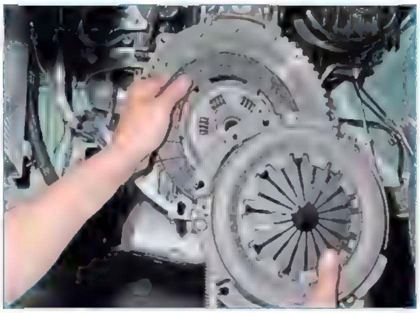


...using an 11 mm socket, loosen the six bolts securing the cover

of the clutch to the flywheel.

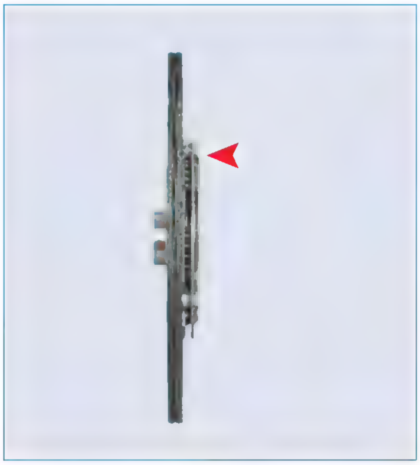
Loosen the bolts evenly, turning each no more than one turn per pass to avoid deforming the clutch basket.

If the bolts are difficult to loosen, tap their heads with a hammer fitted with a soft-metal drift.

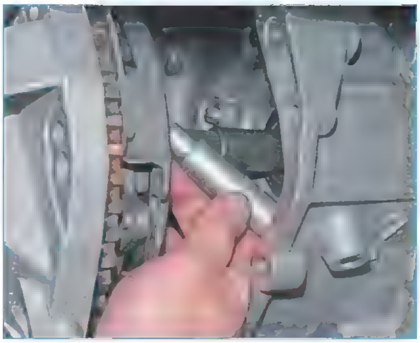


Remove the clutch pressure plate assembly and the driven clutch disc (shown here with the gearbox removed for clarity).

Install the driven plate and the clutch "basket" in reverse order.



When installing the driven plate, orient its protruding part (shown by the arrow) toward the clutch "basket". Position the clutch "basket" so that the dowel pins of the flywheel enter the corresponding holes in the "basket".



Insert the alignment tool (the clutch alignment tool for VAZ vehicles is suitable) into the splines of the driven disc and guide the tool's pilot into the crankshaft flange hole.

Screw in and evenly tighten the opposing bolts that secure the clutch cover to the flywheel (about one turn per pass). Finally, tighten the bolts to the required torque. Remove the centering mandrel of the driven disc. Reinstall the gearbox and all removed parts and assemblies in reverse order. Adjust the clutch actuation mechanism (see “Inspection and adjustment of the clutch release mechanism,” p. 50).

Bleeding the hydraulic clutch actuator on a Sandero Stepway

Bleed the hydraulic clutch release system to remove any air after it has been depressurized, which can occur when replacing drive components.

Remove the protective cap from the bleed nipple of the slave cylinder and fit a clear tube onto the nipple. Place the other end of the tube into a container filled with brake fluid so that the free end of the hose is submerged. It is preferable to position the container under the vehicle, below the level of the nipple.

An assistant depresses the clutch pedal several times and holds it down.

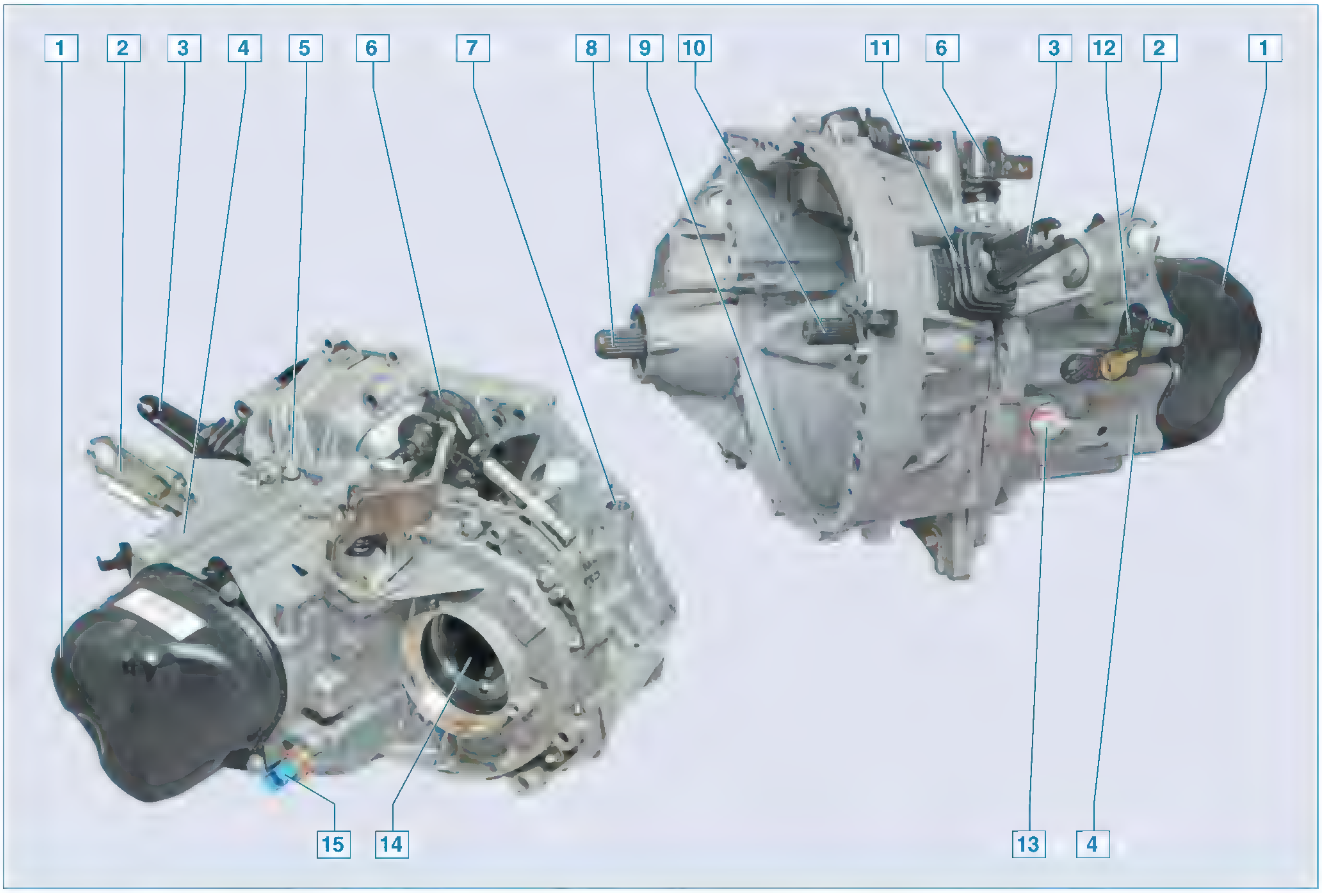
To bleed the actuator, pry out the wire retaining clip with a screwdriver.

Push the steel tube slightly (about 4–6 mm) out of the plastic housing. Brake fluid and any air bubbles that entered the system are displaced into a container placed under the vehicle. The transparent tube allows you to monitor the process.

Push the steel tube back into the housing, hold it with your hand, and repeat the procedure until no more air emerges from the fitting. If necessary, top up the brake fluid in the reservoir on the master brake cylinder.

Manual transmission

Description of the design



Logan and Sandero gearbox: **1** – rear cover; **2** – bracket for the clutch release cable sheath; **3** – clutch release fork; **4** – transmission housing; **5** – breather hose fitting; **6** – gearshift mechanism;**7** – opening for the vehicle speed sensor; **8** – differential side gear shaft; **9** – clutch housing; **10** – input shaft; **11** – dust cover; **12** – wiring harness holder; **13** – oil filler plug; **14** – housing of the inner joint of the left drive; **15** – reverse light switch

On the cars **Logan** and **Sandero** two types of manual transmissions are installed: with a 1.4 L engine – JH1, and with a 1.6 L engine – JH3. The identification is stamped on the bottom of the transmission housing. In construction both gearboxes are identical. The gear ratios of both gearboxes are the same.

The gearbox is two-shaft, with five forward gears and one reverse gear, with synchronizers on all forward gears. It is structurally combined with the differential and the final drive.

The gearbox housing consists of three parts: the clutch housing, the gearbox housing, and the rear cover of the gearbox housing. The clutch housing and the gearbox housing are cast from an aluminum alloy, while the rear cover is stamped steel. The clutch housing is attached to the gearbox housing with screws. During assembly, a fuel- and oil-resistant sealant-gasket is applied between them. The rear cover is fastened to the gearbox housing with three bolts.

The input shaft is made as a block of driving gears, which are in constant mesh with the driven gears of all forward gears. The gears for all forward gears are helical, while the reverse gear is spur. Gears for 1st–4th gears are made as a single piece

With the input shaft, the fifth gear wheel rotates freely on the shaft. A synchronizer for fifth gear is installed on the rear end of the input shaft. The output shaft is hollow; oil is supplied along it to the driven gears. The driven gears and the 1–2 and 3–4 gear synchronizers are mounted on the shaft. The fifth gear is fitted on the shaft by splines. On the clutch-housing side, the output-shaft bearing is a roller bearing, and on the cover side it is a ball bearing. Under the roller bearing of the output shaft there is an oil collector that directs the oil flow into the shaft. All parts mounted on the output shaft are clamped together in a stack by a bolt screwed into the end of the shaft on the cover side. The driven gear of the final drive is pressed onto the differential housing. Behind the driven gear on the differential housing a tapered roller bearing is installed. Between the driven gear and the bearing a spacer ring is placed; adjusting its thickness sets the preload in the differential bearings. On the other (right) side of the differential housing are mounted the gear for the vehicle speed sensor drive and a second tapered roller bearing. Two planet gears and two axle gears are installed in the differential housing. The planet gears are mounted on a pin secured in the differential housing.

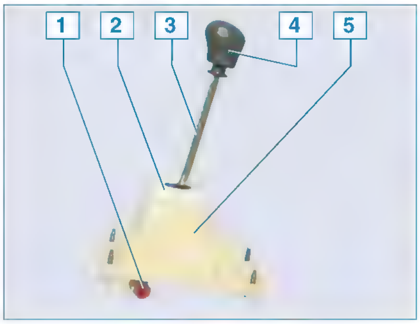
The right half-shaft gear of the differential is made integrally with the splined shaft onto which the inner joint of the right-wheel drive is fitted. A seal pressed into the clutch housing bore runs on the cylindrical surface of the shaft. The left half-shaft gear is formed on the housing of the inner joint of the left-wheel drive, and the housing is seated in the gearbox housing and secured there with a retaining ring. To prevent oil leaks from the gearbox, the connection of the inner joint of the left-wheel drive to the gearbox housing is sealed with a rubber boot that is attached to the gearbox housing by a metal retainer. The other end of the boot is secured to the outer ring of a needle bearing mounted on the left-wheel drive shaft. The needle bearing is integrated with a seal that prevents oil from leaking out of the gearbox along the wheel drive shaft (see “Front-Wheel Drives,” p. 191).

To prevent water ingress and reduce dust entry into the transmission housing, its breather is routed to the upper part of the engine compartment. The breather is connected by a rubber hose to a plastic fitting on the transmission.

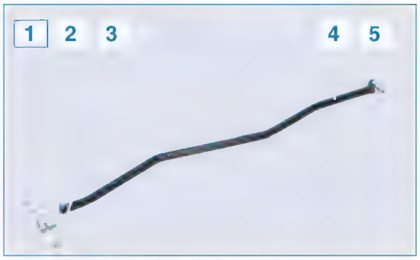
The transmission control drive consists of the control mechanism, the control rod, and the gearshift mechanism. A ball joint is mounted on the gearshift lever; it is inserted into the plastic housing of the control mechanism and secured with a retainer. A sleeve is welded to the lower end of the lever, to which the control rod is attached. The other end of the control rod is connected to the gearshift mechanism installed on the transmission.

Transmission oil, formulated for the vehicle's entire service life, is filled into the transmission at the factory.

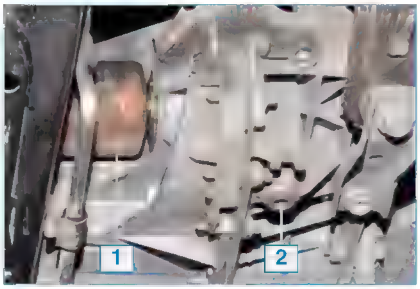
The vehicle **Sandero Stepway** is equipped with the JR5 transmission. The design of this transmission is generally similar to the design of the JH1 and JH3 family transmissions. The difference is mainly in the way the transmission is connected to the drive shafts of the driving wheels. In the JR5 transmission, the half-shaft gears are connected to the splined trunnions of the inner joint housings of the drive shafts. The inner joint housing of the left-drive wheel is secured in the half-shaft gear by a split spring ring, and the extended



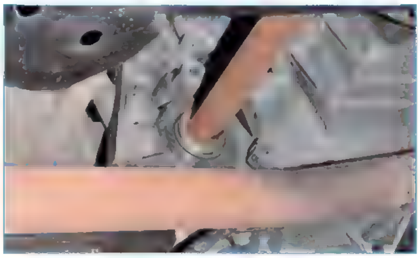
Control mechanism: **1** – bushing; **2** – lever retainer; **3** – gearshift lever; **4** – lever knob; **5** – mechanism housing



Control rod: **1** – drawbolt; **2** – clamp; **3** – nut; **4** – rod; **5** – rod pin



View of the gearbox of the Sandero Stepway: **1** – housing of the inner joint of the left wheel drive; **2** – drain plug

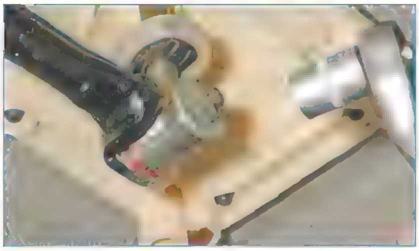


Location of the outlet from the Sandero Stepway gearbox housing for the extended housing of the inner joint of the right wheel drive

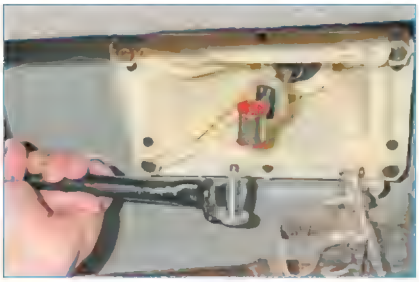
The housing of the inner joint of the right wheel drive is held axially by the bearing of the intermediate support.

Replacing the shift lever bushings

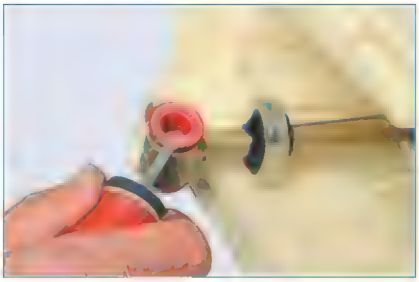
Replace the plastic bushings of the lever when there is significant play in the connection between the lever and the control rod. Perform the work on an inspection pit or ramp. From beneath the vehicle...



...use a 13 mm socket to loosen t he nut securing the control rod to the shift lever.



Withdraw the rod pin from the lever hole.



Pry the bushings out with a screwdriver (for clarity shown on the removed gearshift control mechanism)...

...and pull them out of the lever hole. Install the new bushings in the reverse order.

Apply a thin layer of grease to the inner surface of the bushings. Tighten the nut that secures the control rod to the gearshift lever to the specified torque,

using the prescribed torque.

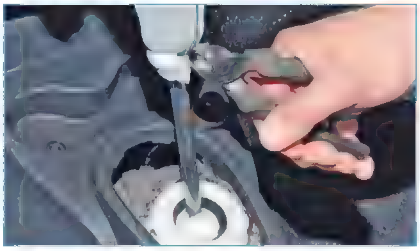
Removal of the gearshift lever

Remove the lever as an assembly for replacement if the ball joint of the control mechanism fails. Work is carried out over an inspection pit or on a ramp.

From beneath the vehicle, disconnect the control rod from the lever (see “Replacing the shift lever bushings”).

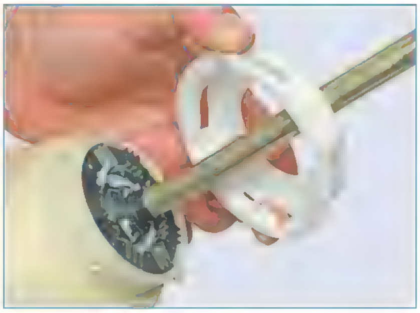
Inside the vehicle...

...we separate the cover from the tunnel trim.

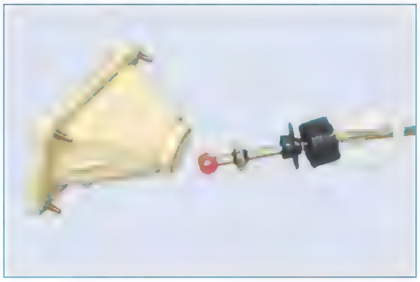


Cut the plastic clamp with side cutters.

Remove the decorative cover from the lever.



By turning the ball joint retainer of the lever, we remove the retainer (shown on the removed control mechanism for clarity)...



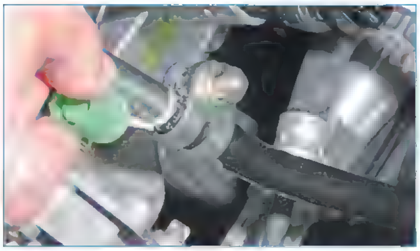
...and pull the shift lever assembly out of the control mechanism housing. Install the shift lever in reverse order.

Removing the transmission control rod

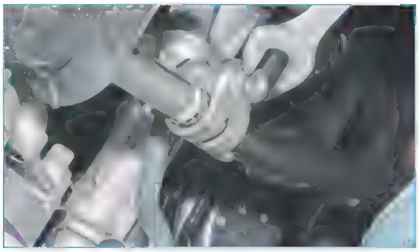
We remove the rod to replace it if it is damaged.

Perform the work over an inspection pit or service ramp.

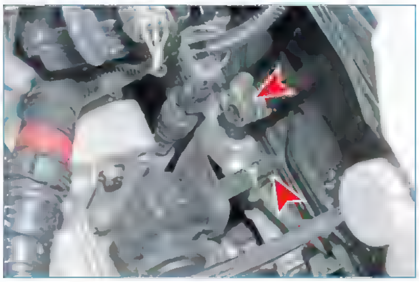
Before removing the rod...



...mark its position on the shift rod of the gearshift mechanism.



Using a 13 mm wrench, loosen the clamping nut of the clamp's draw bolt that secures the rod to the shift mechanism rod.

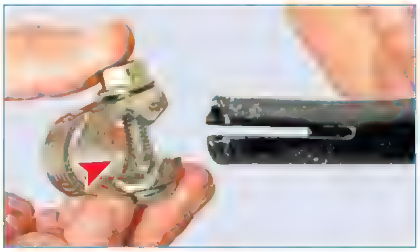


Remove the rod from the shaft.

Disconnect the rod from the gearshift lever (see “Replacing the gearshift lever bushings,” p. 188).

If necessary, remove the clamp from the rod. Reinstall the transmission control rod in the reverse order.

When installing the clamp on the rod...



...orient it so that the projection on the clamp tongue is positioned in the longer slot of the rod.

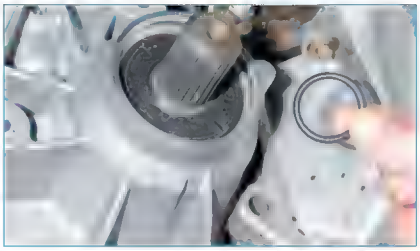
Place the rod onto the shift lever rod at the previously marked position and secure it with the clamp.

Replacing the right-wheel drive oil seal

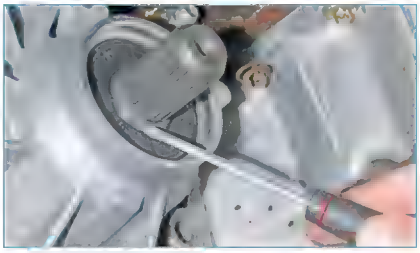
We replace the right-wheel drive oil seal if oil leakage through it from the gearbox is detected. Perform the work over an inspection pit or on a service ramp.

Drain the oil from the gearbox (see “Checking the level and adding oil to the manual gearbox,” p. 47).

Remove the right-wheel drive (see “Removing front wheel drives,” p. 194).



Remove the sealing rubber ring.

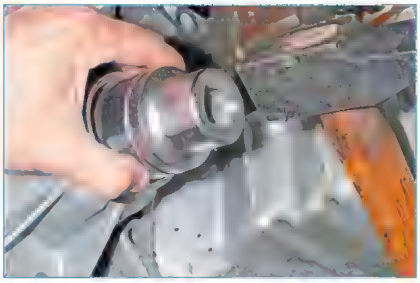


Pry the drive oil seal out with a screwdriver...

...and remove it from its seat in the gearbox housing—the transmission housing.

To avoid damaging the seal's working lip on the splines of the axle gear when fitting a new seal, wrap the splines with insulating tape.

Apply a thin layer of transmission oil to the working edge of the new seal...



...and use a suitably sized drift to press the seal into the gearbox housing bore.

Remove the insulating tape from the splines of the axle shaft of the half-shaft gear. Z

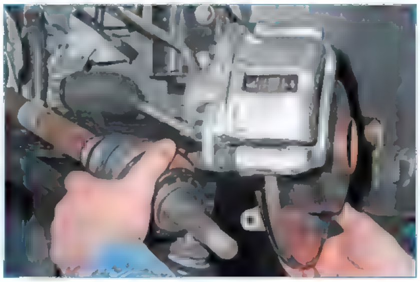
we pour oil into the coro to the gearbox and install the wheel drive.

Removing the gearbox

We remove the gearbox for its repair or replacement, and also when removing the engine.

Work is performed over an inspection pit or on a ramp. The gearbox removal procedures are shown on a Logan vehicle with a 1.4–1.6 (8V) engine.

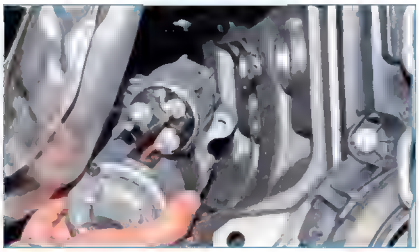
Disconnect the cable terminal from the negative post of the battery.



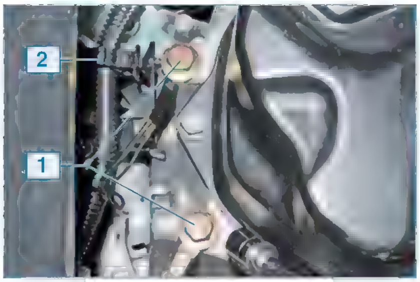
Remove the wheel drives (see “Removing front wheel drives,” p. 194).

Remove the subframe (see “ Removing the subframe,” p. 204).

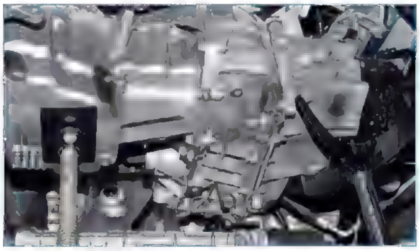
Disconnect the cable from the fork of the clutch release mechanism and from the bracket on the gearbox (see “Replacing the clutch release cable,” p. 193). Disconnect the gearbox control rod from the shift mechanism shaft (see “Removing the control rod the gearbox", p. 188). Remove the crankshaft position sensors (see " Removing the crankshaft position sensor", p. 106) and the vehicle speed sensor (see "Removing the speed sensor", p. 110). Remove the breather hose from the transmission case fitting. Disconnect the wire connector from the reverse light switch (see "Removing the reverse light switch", p. 261). Pull the wiring harness of the oxygen concentration control sensor out of the holder on the transmission (see " Removing oxygen concentration sensors", p. 109).



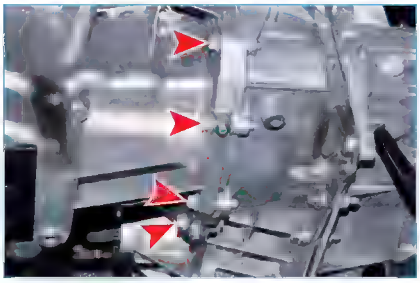
Remove the starter (see "Removing and testing the starter", p. 251).



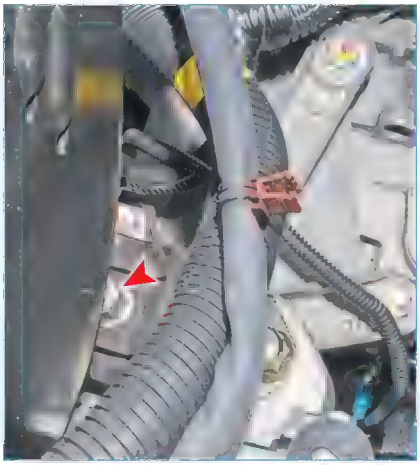
Using a 13 mm socket, loosen two bolts 1 that secure the mass-wire connector mounts to the transmission housing. Spread the plastic retainer 2 and withdraw the wiring harness from it.



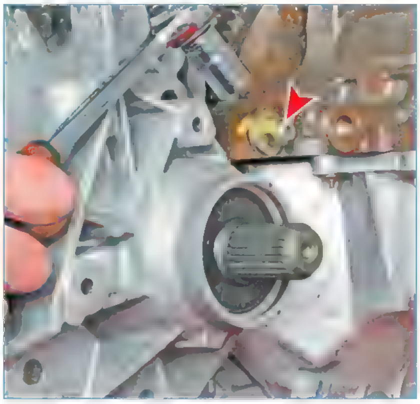
Insert adjustable supports under the engine and the gearbox.



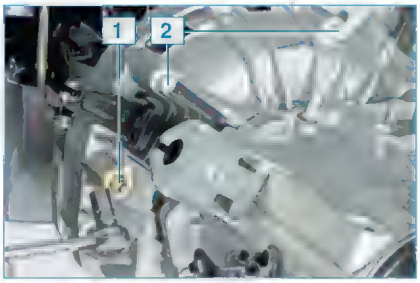
Loosen the four bolts securing the engine oil pan to the clutch housing (see "Replacing the oil pan gasket," p. 94).



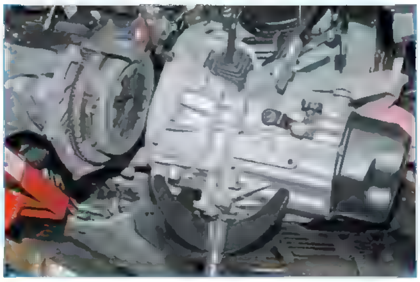
Using a 16 mm wrench, loosen the nut securing the left mount of the power unit to the support bracket.



Using a 13 mm socket, unscrew the nut securing the gearbox to the cylinder block, located above the splined shaft of the right half-shaft gear of the differential (shown on the removed powertrain for clarity).



Using a 13 mm socket, unscrew nut 1 and the two bolts 2 securing the gearbox to the cylinder block (shown on the removed powertrain for clarity).
Lower the power unit onto the adjustable supports to withdraw the stud of the left mount bracket from the mount cushion.



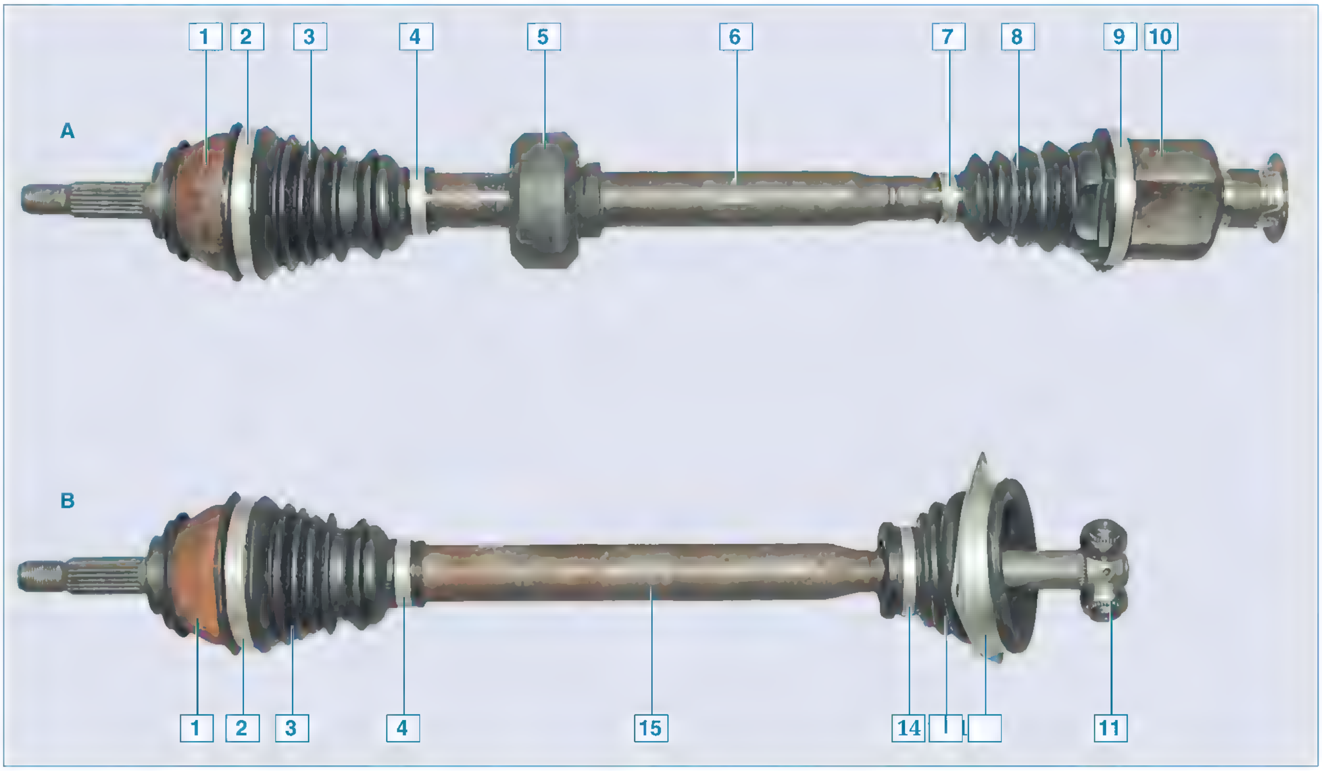
Move the gearbox away from the engine, withdrawing the input shaft from the hub of the driven clutch disc......and remove the gearbox.

When removing and installing the gearbox, do not rest the gearbox input shaft on the petals of the diaphragm spring to avoid damaging them.

Before installing the gearbox, apply a thin layer of SHRUS-4 grease to the splined end of the input shaft. Insert the gearbox input shaft into the splines of the driven clutch disc and, orienting the gearbox so that the cylinder block stud and the clutch housing stud align with the corresponding holes in the housing and block, push the gearbox fully against the engine cylinder block. Perform subsequent assembly operations in reverse order. Refill the gearbox with oil.

Front-wheel drives

Construction description



Drives of the right "A" and left "B" wheels of Logan and Sandero vehicles: 1 – outer joint housing; **2** – large clamp for fastening the outer joint boot; **3** – outer joint boot; **4** – small clamp for fastening the outer joint boot;**5** – damper; **6** – right wheel drive shaft; **7** – small clamp for fastening the inner joint boot of the right wheel drive;**8** – inner joint boot of the right wheel drive; **9** – large clamp for fastening the inner joint boot of the right wheel drive; **10** – inner joint housing of the right wheel drive; **11** – three-stud inner joint of the left wheel drive; **12** – holder for the inner joint boot of the left wheel drive; **13** – inner joint boot of the left wheel drive;**14** – clamp for fastening the inner joint boot of the left wheel drive; **15** – left wheel drive shaft

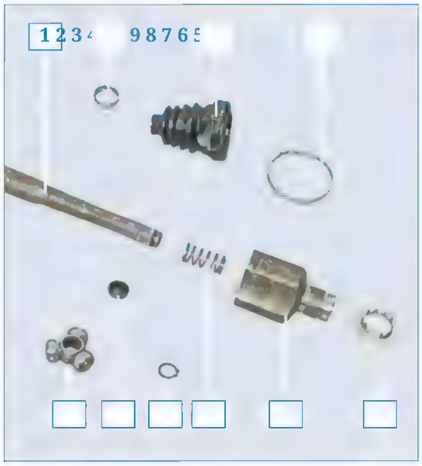
Wheel drives with constant velocity joints (CV joints) are used to transmit torque from the final drive to the driving wheels at various steering angles and suspension travel.

Wheel drives of Logan and Sandero cars

They try to make the drive shaft lengths identical, since this condition ensures equality of the forces and torques arising at the driving wheels. Constructively, to achieve this condition on a car with a transversely mounted powertrain is difficult, so on such cars, as a rule, the right drive is significantly longer than the left drive.

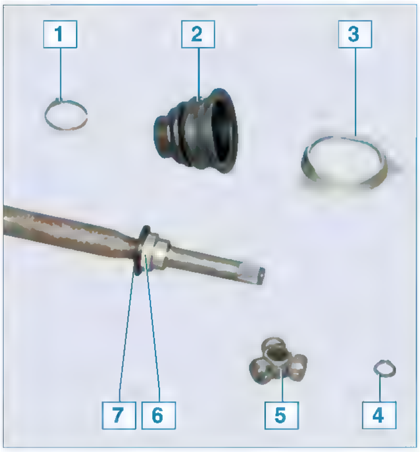
For the Logan and Sandero cars, design solutions were applied that allow the drive shaft lengths of the driving wheels to be brought closer together. The drive shaft lengths of the driving wheels are equalized by using different designs of the inner joints. In order to increase the length of the left-wheel drive, the housing

The inner drive joint is housed inside the gearbox housing. To reduce the length of the right-hand drive shaft, the inner joint housing is set back from the gearbox housing. For this purpose, an additional element — a splined shaft — was added to the gearbox design; this shaft is manufactured as one piece with the differential half-gear. A rubber-metal damper is fitted on the right-wheel drive shaft. Outer and inner joints



Components of the inner joint of the right wheel drive: 1 – drive shaft; **2** – small clamp for securing the boot;**3** – joint boot; **4** – large clamp for securing the boot; **5** – mud shield; **6** – joint housing; **7** – spring;

8 – snap ring of the tripod;**9** – spring thrust washer;**10** – tripod



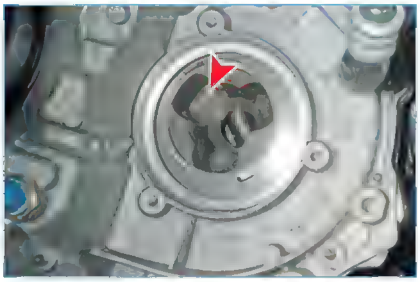
Components of the inner joint of the left wheel drive: 1 – clamp for securing the boot to the outer bearing race; **2** – joint protective boot; **3** – boot retainer; **4** – snap ring of the tripod; **5** – tripod;**6** – bearing; **7** – dirt deflector

Drive shafts (Tripod type) have different constructions. The drive joint bearings are covered with dirt-protective boots.
The inner drive joint provides for angular movement of the suspension and compensates for relative displacements between the suspension and the power unit by changing the drive shaft length. The inner joint is serviceable. On the splined end of the drive shaft at the inner joint side there is a hub with three ears — a three-ear coupling; on each ear (pin) there is a roller with an external spherical surface that rotates on a needle bearing. The needle bearing is secured against axial movement by a retaining ring fitted over a circlip seated in a groove in the ear. The three-ear coupling is fixed to the drive shaft with a circlip. Relative movements of the suspension and the power unit are accommodated by the rollers of the three-ear coupling moving in the longitudinal slots of the inner joint housing.

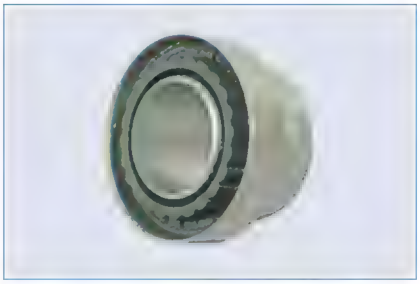
The inner joints of the left and right wheel drives are not interchangeable.
The tip of the housing of the inner joint of the right wheel drive fits onto...

...the splined shaft that extends from the transmission housing and is formed together with the differential axle gear (shown on the removed transmission for clarity).

The spring installed inside the housing of the inner joint of the right-wheel drive ensures the housing presses against the differential side gear when the suspension operates.



The housing of the inner joint of the left-wheel drive is located in the gearbox and is integrated with the left differential side gear (the wheel drive is removed for clarity).

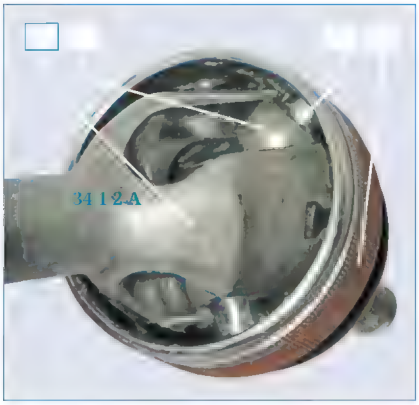


Bearing (assembled with seal) of the inner joint of the left drive

On the drive shaft of the left wheel, behind the three-prong inner joint, a needle bearing assembled with a seal is installed. The inner ring of the bearing is pressed onto the drive shaft and rotates with it. A protective boot of the inner joint is secured with a clamp to the stationary outer ring of the bearing. At its other end, the joint boot is attached to the transmission housing via a metal flanged retainer.

The oil seal installed in the outer bearing race prevents oil from leaking out of the gearbox along the drive shaft. The bearing seal is protected from dirt by a plastic dirt deflector mounted on the shaft.

! **If the protective boot of the joint or the bearing oil seal is damaged, oil will leak from the gearbox.**



Outer drive joint: 1 – knuckle; **2** – roller; **3** – tripod;**4** – joint housing

The outer drive joint transmits torque at various steering angles of the driven wheels. The outer joints of both drives are identical, non-serviceable, and are not removed from the shafts. The outer joint consists of a housing that rigidly holds a three-pin member with rollers rotating on needle bearings, and a knuckle that is integrally formed with the drive shaft. When the housing and knuckle of the joint undergo relative angular displacement, the rollers of the three-pin member roll in the longitudinal grooves of the knuckle.

The splined tail of the outer joint housing fits into the splined bore of the wheel hub and is secured by the hub bearing nut.

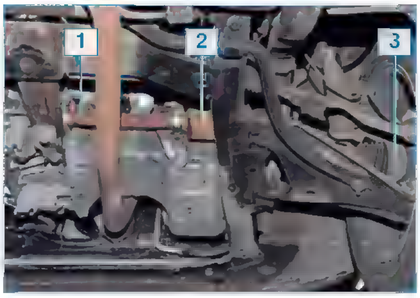
A grease of the MOBIL CVJ 825 BLACK STAR type has been packed into the outer joints of both drives and the inner joint of the right-hand drive for the duration of their service life.

Refilling or replacing the grease, as well as any other maintenance of the drive shafts of the wheels during vehicle operation, is not required. The vehicle owner only needs to monitor the condition of the protective boots of the joints and the clamps that secure them, as well as the condition of the seal of the inner-joint bearing of the left drive. A damaged boot should be replaced as soon as possible to prevent dirt from entering the grease, which causes rapid wear of the joint components and their failure, and because damage to the rubber boot or the seal of the inner-joint bearing of the left drive will lead to oil leakage from the gearbox and its failure. When fitting a new joint boot, its securing clamps should also be replaced with new ones.

If an outer joint fails, the entire drive assembly must be replaced; if an inner joint fails, only the joint of the drive can be replaced. The bearing (assembled with the oil seal) of the inner joint of the left-wheel drive is supplied with spare parts together with a protective boot. The same bearing is used on the following Renault models: Megane, Scenic, Clio, Twingo, Kangoo; Citroën Saxo; Peugeot 106; Volvo: 440, 460, 480. However, the protective boot for the joint on those vehicles is different.

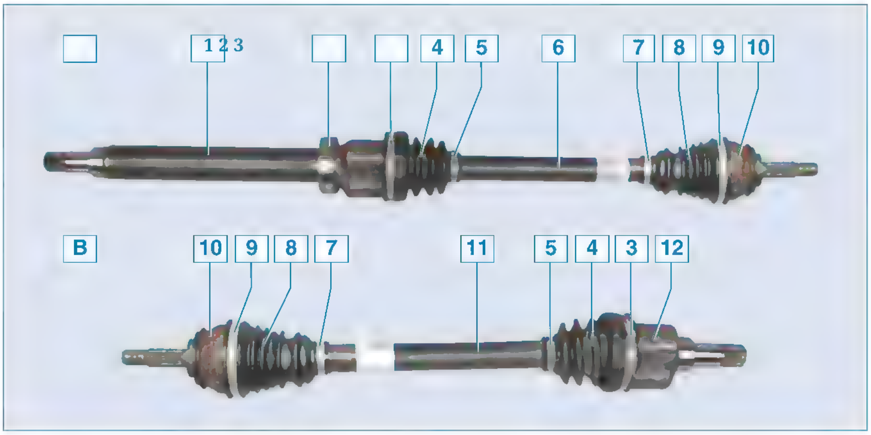
Wheel drives of the Sandero Stepway

The gearbox and drive shafts of the Sandero Stepway vehicle unlike the Logan and Sandero cars, have a different design.



Drive of the right wheel of the Sandero Stepway: 1 – intermediate shaft with inner joint; **2** – intermediate support; **3** – outer drive joint of the right wheel

This vehicle uses a design that makes the drive lengths of the right and left wheels identical; the right-wheel drive includes an intermediate shaft formed integrally with the inner joint. A bearing for the intermediate support is pressed onto the shaft, and a splined tail is inserted into the hole of the axle gear of the differential case. The shaft is thereby prevented from axial displacement by the intermediate support. Outer



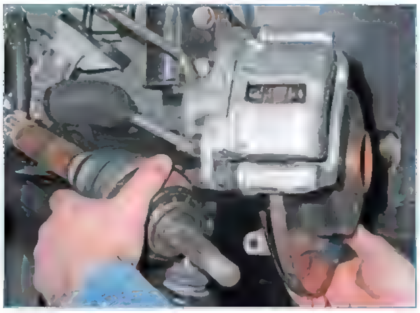
Drives of the right “A” and left “B” wheels of the Sandero Stepway: 1 – intermediate shaft with inner joint; **2** – intermediate support bearing; **3** – large clamp of the inner joint protective boot; **4** – inner joint drive protective boot; **5** – small clamp of the inner joint protective boot; **6** – right wheel drive shaft; **7** – small clamp for securing the outer joint boot; **8** – outer joint protective boot; **9** – large clamp for securing the outer joint boot; **10** – outer joint; **11** – left wheel drive shaft; **12** – inner joint of the left wheel drive

The right and left wheel joints are identical.
The procedures for removing and repairing the front-wheel drives are shown for the Logan vehicle.

Removing the front-wheel drives

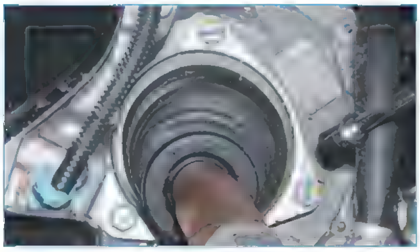
We remove the front-wheel drives when dismantling the gearbox or power unit, when replacing the drives themselves, and when replacing the protective boots of the inner and outer drive joints. We also remove the right drive to replace its oil seal, and the left drive to replace the bearing of the inner joint housing.

The work is carried out over an inspection pit or on a ramp. Remove the power unit protection (see "Removing the power unit protection," p. 283). Before removing the left wheel drive, drain the oil from the gearbox (see " Checking and topping up the oil in the manual gearbox," p. 47).
Unscrew the nut securing the front wheel bearing (see "Replacing the front wheel hub bearing," p. 204). Remove the wheel. Withdraw the ball joint stud of the front suspension from the steering knuckle hole (see " Removing the control arm," p. 203).

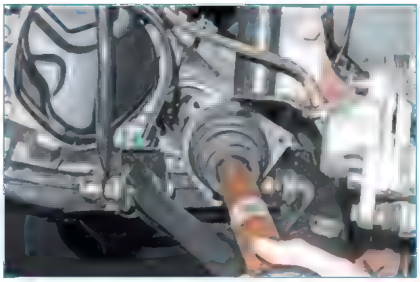


Move the steering knuckle with the strut to the side and withdraw the splined tail of the outer joint housing from the wheel hub.

Clean the holder and the mating surface of the gearbox housing of dirt so that dirt does not get into the gearbox when removing the drive.



Using a 13 mm socket, unscrew the three bolts securing the inner joint boot holder to the gearbox housing.

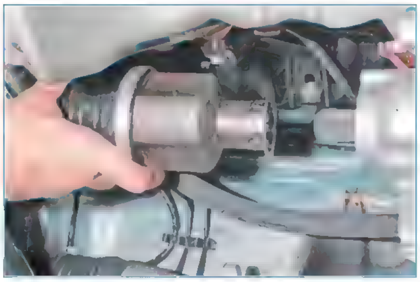


Removing the left wheel drive.
When installing the drive, carefully insert the tripod roller pins into the slots of the inner joint housing and attach the joint boot holder to the transmission housing. Continue installing the drive in the reverse order.

During assembly, do not apply force to the drive along its axis toward the side opposite the transmission, because this may cause the tripod rollers to come out of the inner joint housing slots and damage the roller needle bearings.

If there is the slightest suspicion that the tripod has come out of the inner joint housing slots, you must unscrew the bolts securing the inner joint boot holder and, after confirming the roller needle bearings are in normal condition, repeat the drive installation. After installing the left wheel drive, fill the transmission with oil.

When removing the drive of the right wheel, it is not necessary to drain the oil from the gearbox. By unscrewing the nut securing the hub bearing and disconnecting the ball joint from the steering knuckle, we extract the splined tail of the drive shaft of the outer joint from the wheel hub, as shown above.



Slide the tip of the inner joint housing of the right wheel drive off the splined shaft of the differential side gear......and remove the right wheel drive.
Install the right wheel drive in reverse order.

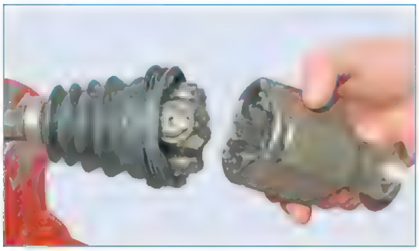
Replacing the dust boot of the inner right-wheel drive joint

wheel

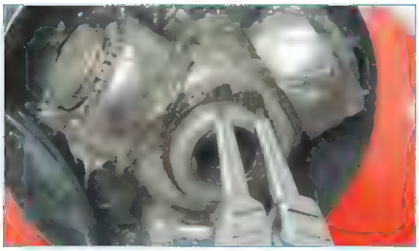
Perform the work if the boot is damaged or the joint is being replaced. Remove the front right drive (see "Removing the front drives").
Clean the joint from the outside and clamp the shaft in a vise with soft-metal jaw covers.

Use a hacksaw (or cut with diagonal cutters) to cut through the large clamp securing the boot, taking care not to damage the joint housing.

We are removing the cover from the body of the inner hinge...

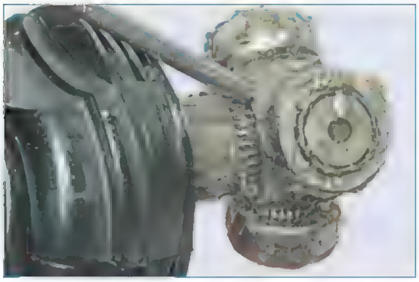


...and remove the joint housing. After removing the grease from the end of the tripod...



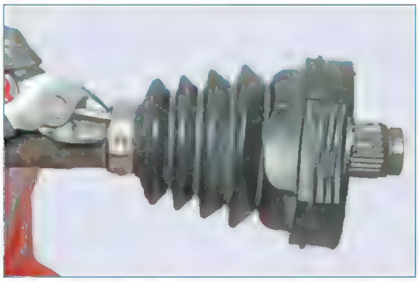
...use circlip pliers to remove the retaining ring.

If only the joint boot is being replaced, mark the position of the tripod relative to the shaft.



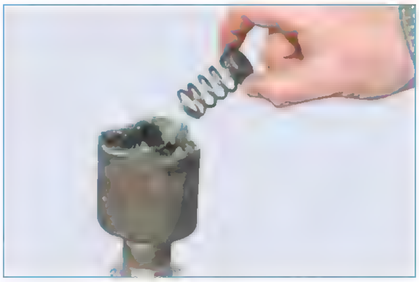
Strike the end of the tripod with a drift made of soft metal to drive the tripod off the shaft.

The punch should not transmit force to the three-spike roller pins to avoid damaging them.



Cut the small clamp with diagonal cutters...

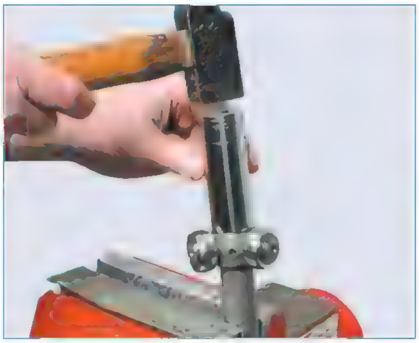
...and remove the mud-protective boot of the joint.



Remove the spring together with the thrust washer.

If the spring is broken or has lost its elasticity, replace it with a new one. Remove the old grease from the joint housing and wash it in kerosene. Wipe the joint with a rag and blow it out with compressed air. Inspect the rollers, needle bearings of the three-prong piece, and the inner cavity of the joint housing. The three-prong rollers should rotate on the needle bearings freely, without seizing. Scratches, dents, cracks, or signs of corrosion are not acceptable — replace any such joint.

Before fitting a new joint boot, apply a small amount of grease to the end of the shaft. When slipping the boot onto the shaft, position its ridge under the small clamp in the shaft groove. Insert and evenly distribute half of the recommended amount (124±10 cm^3) of the required grease into the joint housing cavity, and place the other half in the boot cavity.



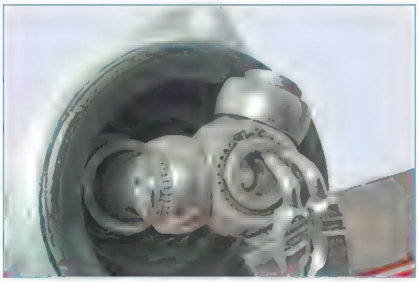
Using a drift, press the tripod onto the shaft to the position marked when it was removed. Install a new retaining ring into the shaft groove.

Place the joint housing onto the tripod and pull the boot over the joint housing, positioning the boot's band beneath the large clamp in the housing's locating groove. Secure the joint boot with new clamps (see “Replacing the outer drive wheel joint dust boot,” p. 196). Reassemble in the reverse order.

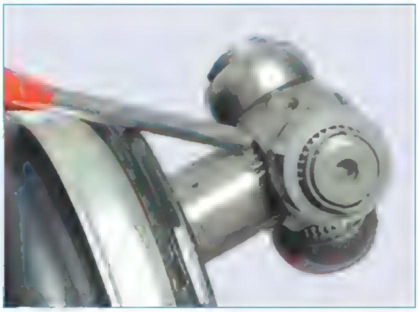
Replacement of boot and bearing of the inner drive joint of the left wheel

We perform the work when the boot is damaged or when replacing the joint boot bearing. Remove the front left wheel drive (see “Removing the front drives,” p. 194).

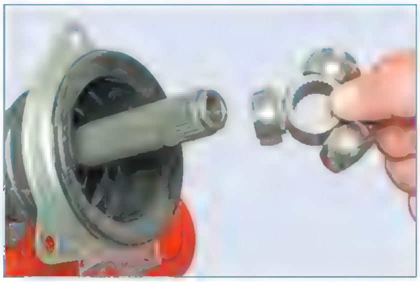
Clamp the drive shaft in a vise with soft-metal jaw covers.



Use circlip pliers to remove the retaining ring. Mark the position of the tripod relative to the shaft.



By striking the end of the tripod through a soft-metal drift, drive the tripod off the shaft...



...and remove it.

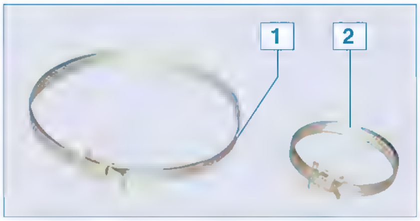
The drift punch must not transmit force to the three-prong roller to avoid damaging it.

Cut the clamp securing the cover with diagonal cutters...

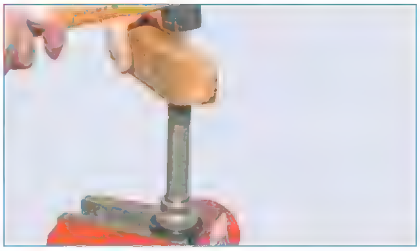
...and remove the dirt cover together with the holder.

Remove the holder from the cover.
Inspect the rollers and needle bearings of the tripod. The tripod rollers must rotate freely on the needle bearings without sticking. Score marks, dents, cracks, or signs of corrosion are not acceptable — such a tripod should be replaced with a new one.

If the cover bearing seal leaks oil from the gearbox or the bearing itself is faulty (play or seizure in the bearing), it must be replaced. To do this, clamp the drive shaft in a vise so that the bearing rests onto the vise jaws through the dirt deflector against the seal holder.



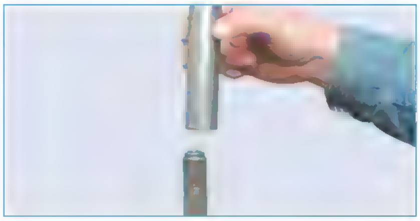
Universal band clamps for securing the CV boot: 1 — clamp for fastening the boot to the joint housing;
2 — clamp securing the boot on the shaft at the
вода



When striking with a hammer through a wooden block against the shaft end...

...we press the bearing out together with the seal...

with the seal...
...and remove the dirt deflector from the shaft.
Place the new dirt shield and the bearing assembly with the seal onto the shaft.
The bearing can only be pressed in using a press, because using an impact method can damage the bearing and its seal. For correct positioning on the shaft, the bearing must be pressed on so that the distance between the bearing's end faces and the shaft is 118±0,2 mm. For this you need a mandrel, which can be made from a length of tubing with an outer diameter of 30 mm, an inner diameter of 26 mm, and a length of 118±0,2 mm.



Place the mandrel onto the shaft...

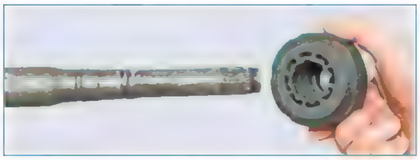
...and press the bearing in on the press until the end of the mandrel is flush with the shaft shoulder. Fit the new joint boot onto the shaft and secure it to the outer bearing race with a new clamp. Press the tripot onto the shaft into the position marked before removal and lock it onto the shaft with the retaining ring. Put the holder onto the boot.

Replacing the dirt boot of the outer wheel drive joint

Replace the outer joint boot if it is damaged. Because the outer joint is non-serviceable, a new boot can only be fitted onto the joint housing by first removing the inner joint and pulling the boot over the entire shaft.

We show replacement of the outer joint boot using the right-wheel drive as an example. Remove the inner joint boot (see “Replacing the inner joint drive boot of the right wheel”, p. 194).

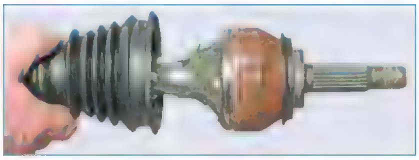
Mark the position of the damper relative to the shaft with a marker.



Pull the damper off the shaft.

Thoroughly clean the drive shaft of dirt and corrosion.
Using a hacksaw for metal (or cutting with side cutters) we saw through the si-

large and small clamps for securing the boot.



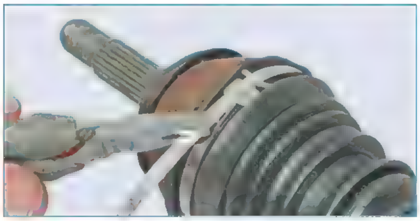
Remove the boot from the outer joint housing...

...and pull it over the entire shaft or cut it with a knife.

Remove the old grease from the joint and wash it in kerosene. Blow the joint with compressed air. While rotating the joint housing relative to the knuckle into different positions, inspect the tripod rollers and the knuckle grooves. Burrs, dents, cracks, or signs of corrosion on joint components are not permitted; the tripod rollers must move smoothly in the knuckle grooves without sticking. If the outer drive joint is faulty, the entire drive must be replaced.

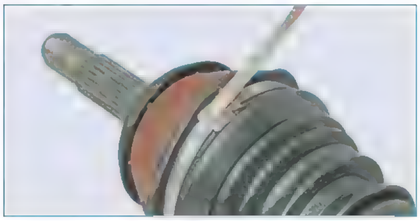
Before fitting a new boot on the outer joint, apply a thin layer of grease to the shaft surface. After slipping the boot onto the shaft, position its bead under the small clamp in the shaft groove. Place and evenly distribute the required amount of grease in the joint cavities and its boot (294±10 cm^3). Stretch the boot over the joint housing, positioning the boot's bead under the large clamp in the housing's locating groove. Secure the joint boot with new clamps.

To install the original clamps supplied as spare parts, special pliers are required. If those are not available, you can use universal band clamps for securing CV boot covers that are commercially available. We show the installation of a universal band clamp that secures the boot to the joint housing. After seating the clamp in the boot groove...



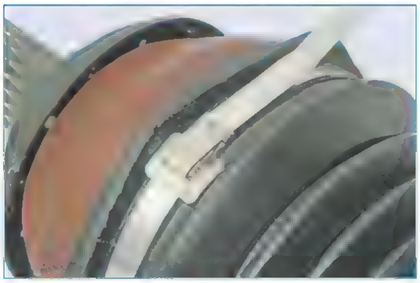
...use pliers to pull the band, tightening the clamp.

With another pair of pliers, brace against the clamp lock or the retainer tabs to prevent the clamp from turning. After tightening the clamp firmly...



...bend the pulled-out end of the band in the opposite direction.

While holding the tape in a tensioned position, check the clamp's tightness by trying to move the clamp past its lock along the cover groove. If the clamp moves, its tightening is insufficient and the clamp must be retightened. After firmly cinching the clamp...

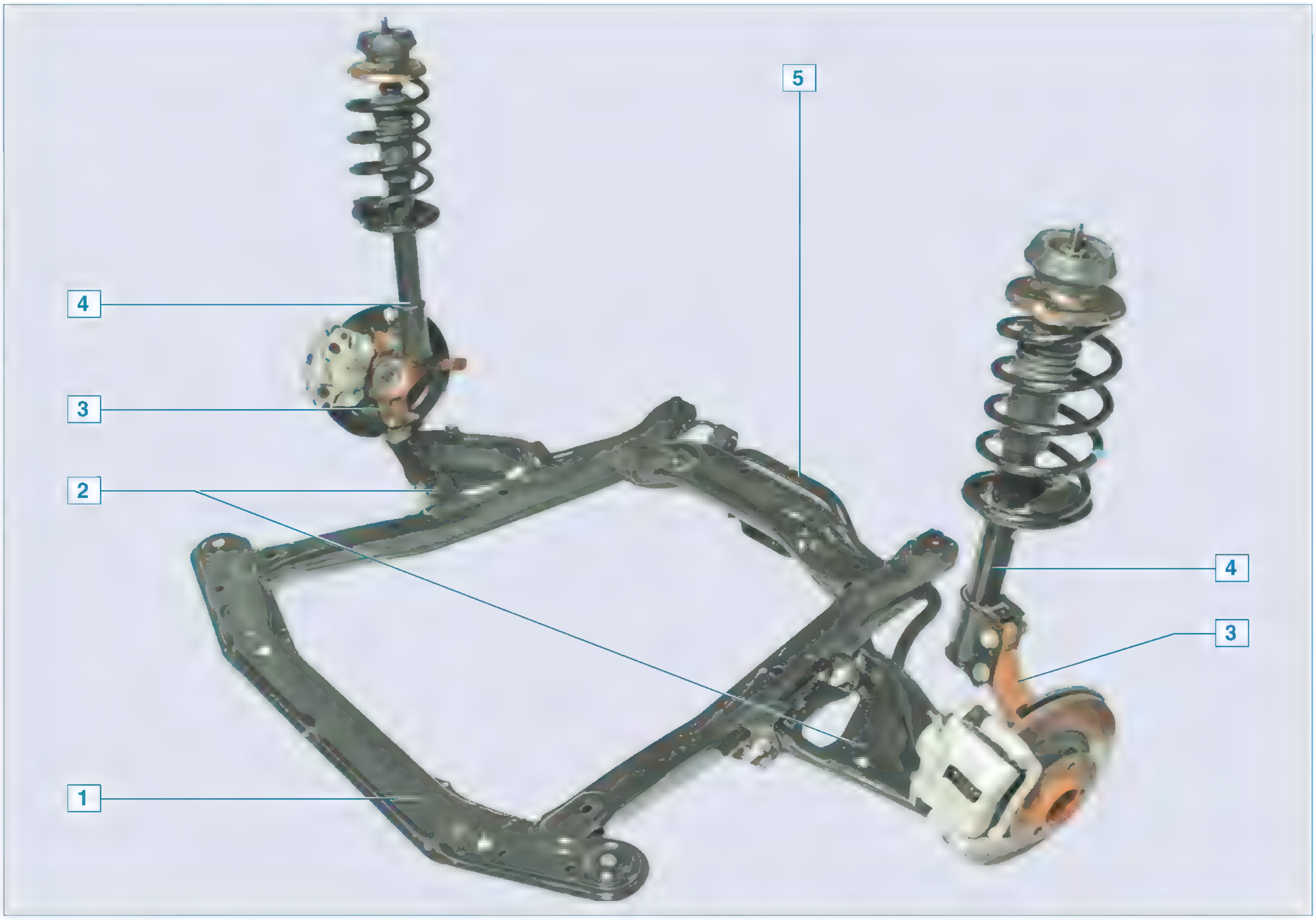


...bend the retainer tabs onto the band. Secure the boot to the drive shaft with a clamp in the same way. Check the boot's clamp fastening for security. When the joint housing moves angularly relative to the shaft, the boot must not shift on the housing, slide along the drive shaft, or rotate on them. Cut off the excess band tail (beyond the retainer tabs) with side cutters.

Reassemble the drive in reverse order. When replacing the outer joint boot of the left wheel drive, remove the boot and the inner joint bearing of the drive (see " Replacing the boot and inner joint bearing of the left-wheel drive," p. 195). The subsequent steps for replacing the outer joint boot of the left-wheel drive are the same as those for replacing the outer joint boot of the right-wheel drive.

Front suspension

Description of the design



Front suspension: 1 – subframe; **2** – suspension arm with bushings and ball joint; **3** – steering knuckle with hub and bearing; **4** – shock absorber strut; **5** – anti-roll stabilizer bar

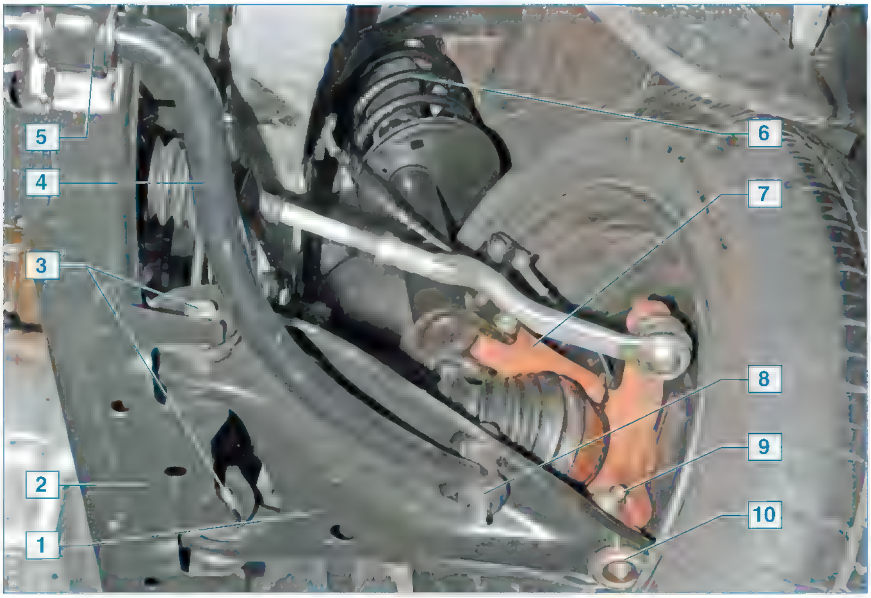
The front suspension is independent, MacPherson-type with triangular transverse arms and an anti-roll stabilizer (on some vehicles).

The basis of the suspension is a telescopic shock-absorber strut that allows the wheels to move up and down when passing over bumps while simultaneously damping the body's oscillations. The bottom of the strut is attached with two bolts and nuts to the steering knuckle, and at the top with a nut – to the body through a rubber-metal mount.

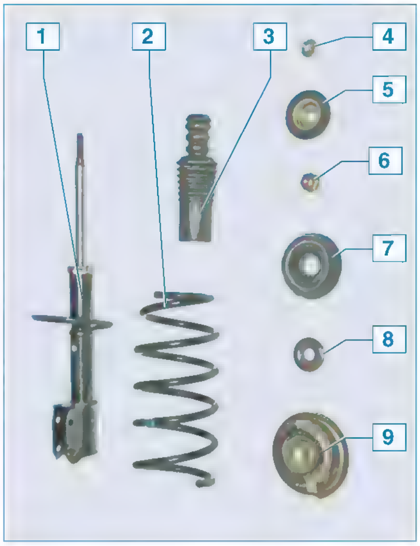
To effectively dampen body vibrations and improve the vehicle's handling and stability, the strut housing is fitted with a twin-tube gas-filled shock absorber, which has higher performance than a conventional hydraulic shock absorber. A lower spring seat is welded to the middle part of the strut housing, and a bracket for mounting the strut to the steering knuckle is attached to the lower part of the strut.

A compression stroke bumper, formed together with a protective cover, is installed on the shock absorber rod. The spring bears against an upper spring seat mounted on the shock absorber rod. A thrust ball bearing is installed between the upper spring seat and the upper strut support, allowing the strut housing to rotate with the spring while the shock absorber rod remains stationary.

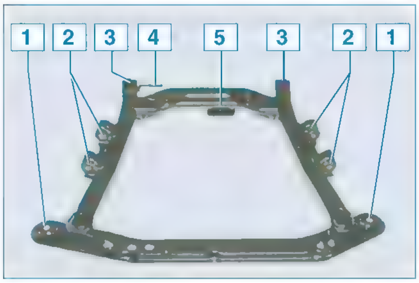
Brake and traction forces during vehicle motion are absorbed by



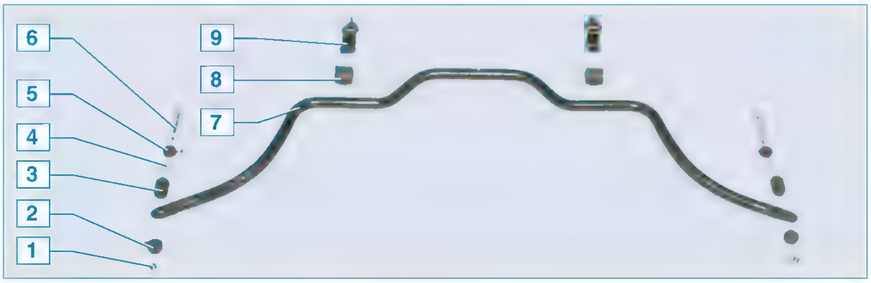
Front suspension components on the vehicle: 1 – control arm; **2** – subframe; **3** – bolt securing the arm to the subframe; **4** – anti-roll stabilizer bar link; **5** – bracket securing the stabilizer bar to the subframe; **6** – shock absorber strut; **7** – steering knuckle; **8** – stabilizer bar attachment components to the arm; **9** – clamping bolt of the steering knuckle terminal connection and ball joint stud; **10** – ball joint



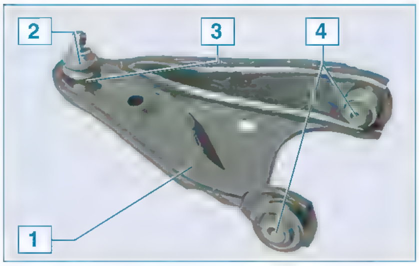
Shock absorber strut parts: 1 – telescopic strut; **2** – spring coil; **3** – compression travel buffer with protective boot; **4** – nut securing the strut to the body; **5** – support washer; **6** – nut securing the upper mount; **7** – upper strut mount; **8** – upper mount bearing; **9** – upper spring seat



Subframe: 1 – front mounting points of the subframe to the body; **2** – mounting points of the suspension arm to the subframe; **3** – rear mounting points of the subframe and the anti-roll bar; **4** – bracket for mounting the suspension mount of the exhaust system; **5** – bracket for mounting the rear engine mount



Anti-roll bar components: 1 – nut; **2** – lower rubber bushing; **3** – intermediate rubber-metal bushing; **4** – plastic washer; **5** – upper rubber bushing; **6** – screw; **7** – stabilizer bar; **8** – clamp; **9** – stabilizer bar bushing



Front suspension arm: 1 – arm;**2** – support boot; **3** – ball joint;**4** – silent block

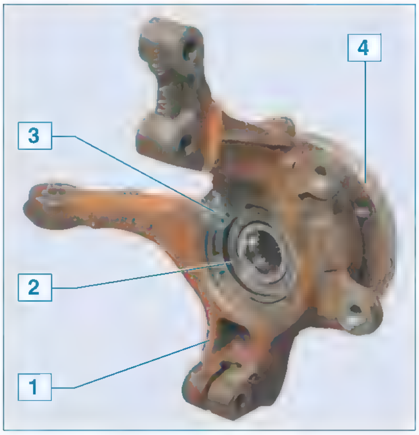
is provided by suspension arms connected via ball joints to the steering knuckles and via silent-block mounts to the subframe.

The subframe is rigidly attached to the body with four bolts; the two rear bolts also secure the stabilizer bar brackets to the subframe. A bracket is fastened with a nut to the front bolt that attaches the suspension arm to the subframe, and the other end of this bracket is attached to the body.

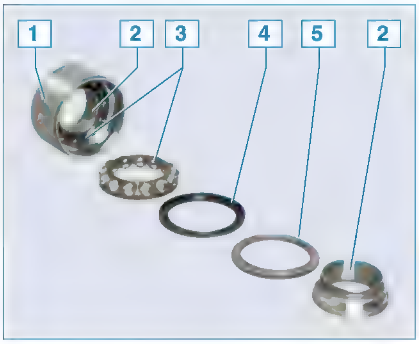
The ball joint housing is pressed into the suspension arm's bore, the joint is sealed with a rubber boot. The ball joint stud of the support is fastened by a clamping connection with a draw bolt in the steering knuckle eye.

A sealed double-row angular-contact ball bearing is pressed into the steering knuckle bore, and the wheel hub is pressed into the bearing inner rings.

The inner rings are clamped (through the hub) by a nut on the threaded section of the driveshaft outer joint housing stub.



Front wheel hub assembly:1 – steering knuckle; **2** – hub bearing; **3** – speed sensor locating ring; **4** – wheel hub



Double-row hub bearing assembly (for clarity, the elements of one row are removed from the outer bearing ring): 1 – outer bearing ring; **2** – inner bearing ring; **3** – cage with balls; **4** – oil seal; **5** – protective washer

The bearing is not adjustable during operation and does not require lubrication replenishment.

Hub bearings for vehicles with ABS and without ABS are not interchangeable. The hub nuts on both wheels are identical, with right-hand threads.

Some vehicles are equipped with an anti-roll bar.

The anti-roll bar is made of spring steel.

The bar is mounted in its middle section to the subframe.

to the brackets through rubber bushings. Both ends of the stabilizer bar are secured with screws and rubber and rubber-metal bushings are connected to the suspension arms. In the middle section of the stabilizer bar there is a bend over the exhaust system's inlet pipe.

The caster angle of the front wheel steering axis (2°42’±30’) and the camber angle (–0°10’±30’) are set by the design and are not adjustable during operation. These angles can only be checked on a special stand (at a service station) and compared with the reference values. If the specified front wheel alignment angles do not match the reference values, the condition of the front suspension components should be inspected.

toe-in (–0°10’±10’) is adjusted by changing the length of the tie rods (see “Replacing the tie rod end,” p. 217).

Removing the shock absorber struts and their disassembly

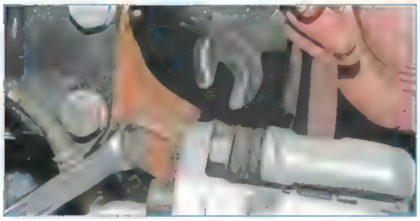
Remove the shock-absorber strut to replace its components. We disassemble the shock-absorber strut when it is necessary to replace its upper mount, upper mount bearing, spring, compression bump stop, or shock absorber. In the engine bay...

...using a Z-shaped wrench " 21mm", loosen the nut of the upper mounting of the shock absorber strut while holding the shock absorber rod from turning with a 6mm hex key.

Remove the wheel and securely support the vehicle on a factory-made stand. On vehicles with ABS...

...using an open-end wrench "10mm", unscrew the bolt securing the speed sensor wiring harness bracket. Move the bracket with the wiring away from the strut.

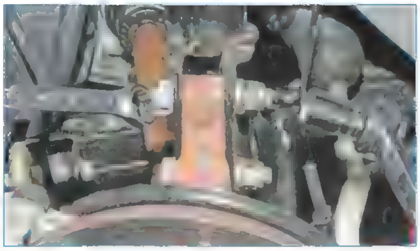
Before removing the strut, it must be separated from the steering knuckle. To do this, the bolts securing the strut to the knuckle must be removed. The lower bolt's removal is hindered by the end of the wheel brake hose.



Using a 13mm open-end wrench, loosen the upper bolt securing the caliper to the guide pin while holding the pin to prevent turning with a 17mm wrench.

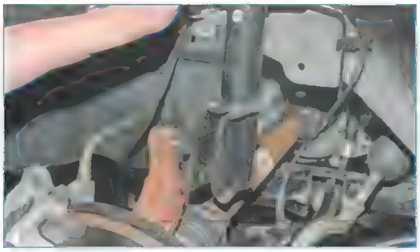
Then rotate the caliper relative to the lower guide pin forward far enough so that the lower bolt securing the strut to the steering knuckle can later be removed.

lacquer.

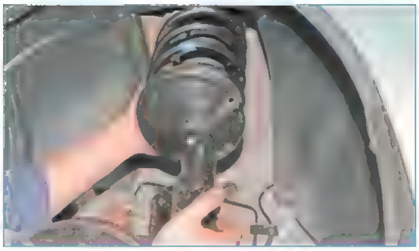


With an 18mm socket, loosen the nut on the upper mounting bolt of the strut to the steering knuckle, holding the bolt with a wrench of the same size.

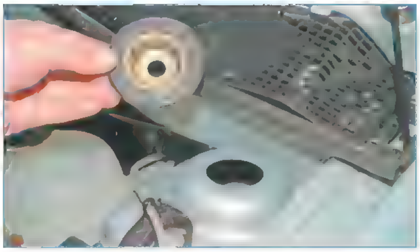
Similarly, loosen the nut on the bolt of the strut's lower mounting. Remove the bolts or drive them out with a soft-metal punch.



Remove the steering knuckle from the strut bracket's eyelet. While supporting the strut to prevent it from falling, finally loosen the nut of its upper mounting.

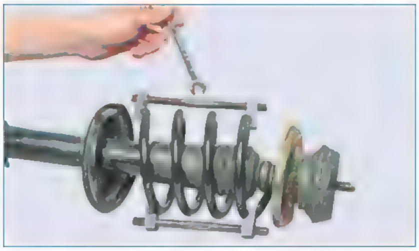


Remove the shock absorber strut.



Remove the rubber-metal support washer of the strut's upper mounting.

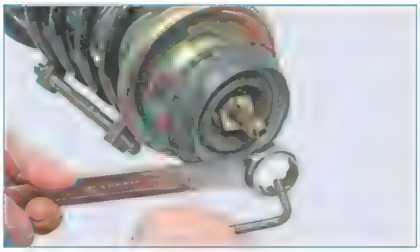
To disassemble the strut, install two spring compressors diametrically opposite each other so that they engage four coils of the spring.



Evenly turning the clamp bolts, compress the spring.

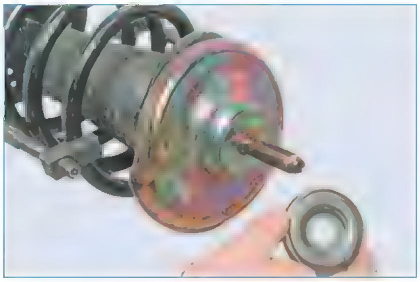
! Exercise caution when working with a compressed spring.

Once the spring no longer presses on the support cups...



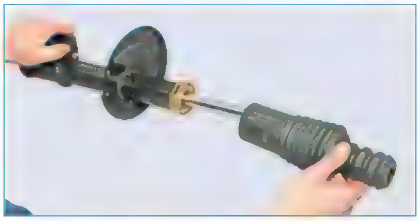
...use a 27 mm box wrench to loosen the nut securing the upper mount, holding the rod to prevent rotation with a 6 mm hex key.

Remove the strut mount...



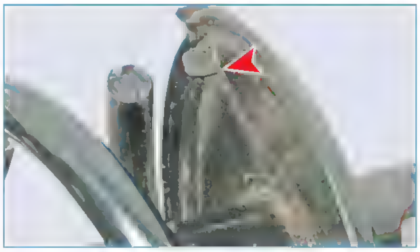
...the upper mount bearing...

...and the spring's upper seat. Remove the spring with the clamps...



...compression stroke bumper with protective cover.

Reassemble and install the strut in reverse order. Install the spring so...



...that its lower coil rests against the projection of the lower spring seat...

...and the upper coil rests against the stamping of the upper spring seat. Tighten the nut securing the upper strut mount and the nuts on the bolts attaching the strut to the steering knuckle to the specified torque. Finally tighten the nut securing the strut to the body to the prescribed torque with the vehicle on its wheels.

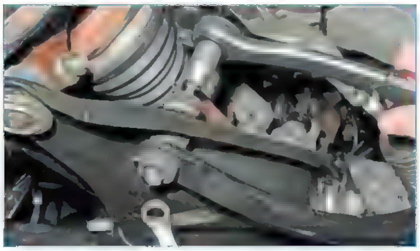
Replacing anti-roll bar components

Replace rubber stabilizer components — bushings and mounts — if the rubber is cracked, torn, or blistered, or if they are worn to the point that play occurs in the connections between parts.

Perform the work in an inspection pit or on a ramp.
Raise the front of the vehicle.

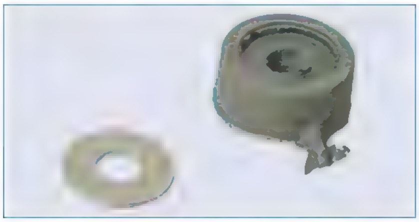
Before unscrewing the nut on the stabilizer bar link bolt to the front suspension arm, thoroughly clean it of contaminants.

the head of the screw, into the recess of which a Torx key must be inserted. If the key does not fully engage the screw head, then under significant force generated in the corrosion-damaged threaded connection when loosening the nut, the screw and the key can be damaged.



Using a 13mm open-end wrench, loosen the nut securing the stabilizer bar to the suspension arm while holding the bolt to prevent rotation with a Torx T-40 wrench.

Remove the lower rubber bushing.



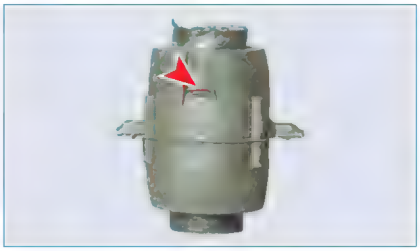
A metal washer is installed in the recess of the bushing's end facing the nut.

Pull out the screw with the upper rubber bushing and plastic washer. Pull the end of the rod down by hand...

...and remove the rubber-metal

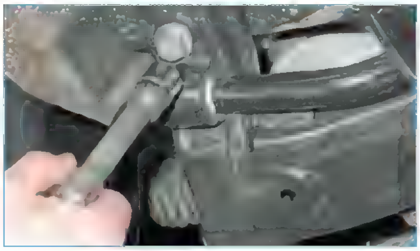
remove the intermediate bushing.

Similarly, remove the mounting parts—for attaching the stabilizer bar to the other arm. Install the new parts in reverse order. Tighten the nuts on the stabilizer bar mounting bolts to the specified torque with the vehicle resting on its wheels.

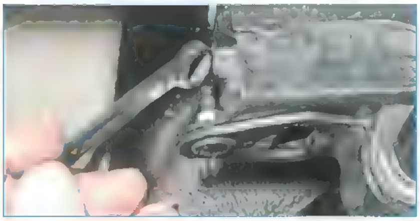


When installing the intermediate bushing, orient it with its slots, located on the bushing's outer surface, facing upward.

To replace the stabilizer bar bushing...

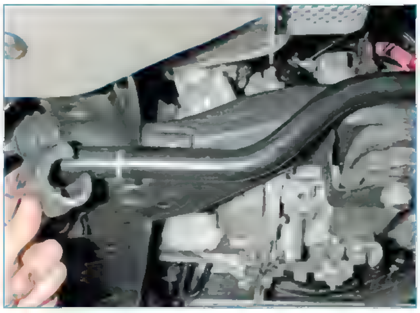


...use an 18 mm socket with an extension to unscrew the bolt securing the bracket of the bushing and the subframe to the body.



Using a 10 mm box wrench, loosen the nut securing the bracket of the mount to the subframe.

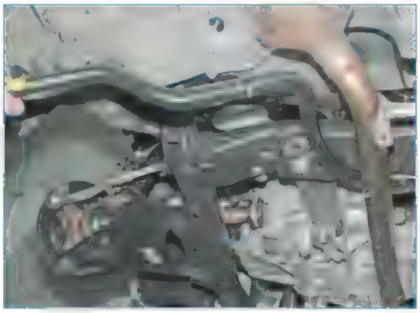
Lower the bracket by pulling its stud out of the subframe opening......and remove the bracket by withdrawing its front end from the subframe groove.



Remove the mount from the rod.

Install the new stabilizer bar bushing in the reverse order.

Similarly replace the bushing on the other side of the stabilizer bar. If it is necessary to remove the bar, disconnect both of its ends from the suspension arms and remove the bushing brackets (see above).

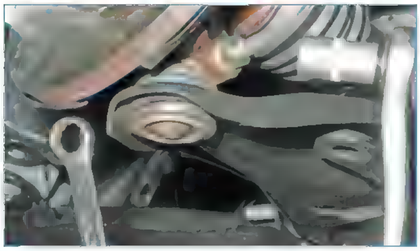


Remove the stabilizer bar. Inspect the stabilizer bar. At the bushing mounting locations there should be no deep abrasive wear. Areas with severe wear greatly increase the likelihood of the bar breaking. Install the anti-roll stabilizer bar in the reverse order.

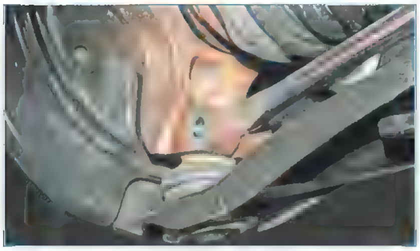
Removing the control arm

The control arm is removed to replace the ball joint or the arm itself if it is damaged, as well as if its bushings are damaged (tears, rubber delamination).

Perform the work on an inspection pit or a ramp.
Raise the front of the vehicle—both front wheels—because raising only one wheel makes the anti-roll bar obstruct the removal of the arm by pushing the suspension components upward. The procedure is shown on the left arm; remove the right arm in the same way.
Disconnect the anti-roll bar link from the control arm (see “ Replacement of anti-roll bar components,” p. 201). Remove the engine compartment splash shield (see “Removal of engine compartment splash shields,” p. 283).



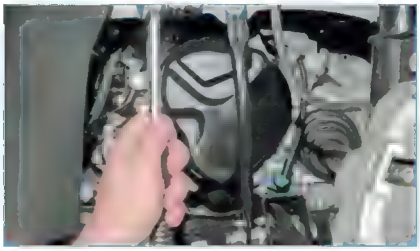
Using a 16-mm wrench, loosen the nut of the tie bolt of the swivel knuckle terminal connection and the ball joint pin, holding the bolt with a wrench of the same size. Remove the bolt or drive it out with a soft-metal drift.



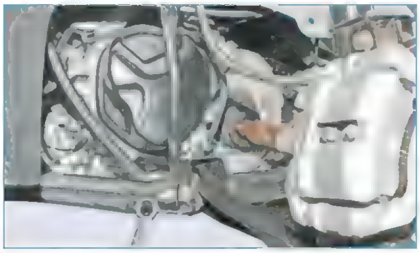
Use a sturdy slotted screwdriver or a pry bar to spread the terminal connection of the steering knuckle and the ball joint stud.

Bracing against the swivel knuckle, pry the lever downward with a trim tool...

...and pull the ball joint stud out of the steering knuckle opening.



Loosen the bolt securing the subframe bracket to the body with a 13 mm socket.



Unscrew the nut securing the subframe bracket with an 18 mm box wrench...

...and remove the bracket from the front bolt that fastens the control arm to the subframe.

Loosen the nut on the front control arm mounting bolt with an 18 mm box wrench while holding the bolt head with a wrench of the same size. Remove the bolt or drift it out using a soft-metal punch.

Similarly, loosen the nut of the rear mounting bolt of the control arm and remove the bolt.

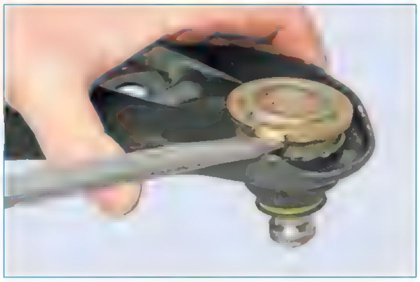
Remove the suspension arm.

Install the arm in reverse order. Finally tighten the nuts of the bolts that secure the arm to the subframe to the specified torque with the vehicle on its wheels.

Ball Joint Replacement

Replace the ball joint if its protective boot is damaged or if play is detected in the joint.

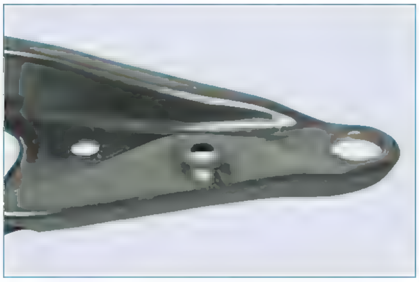
Perform the work over an inspection pit or on a ramp.
Remove the front suspension arm assembly with the ball joint (see “ Removing the arm,” p. 203).



Evenly (from different sides) pry the support housing under the lip with a heavy slotted screwdriver, and

resting on the edge of the arm...

...we press out the ball joint from the control arm hole.



Inspect the control arm eyelet – there should be no cracks or tears around the hole.

Before pressing in the new ball joint, thoroughly clean the mating surface of the control arm hole from dirt and corrosion.

Place a socket or a section of

pipe of appropriate diameter under the arm, and insert the new ball joint into the hole. Striking the sleeve with a hammer (an instrument head may be used) while it rests on the support housing flange...

...press the support into the lever bore until it bottoms out.

We carry out the rest of the assembly in the sub-

reverse order.

Removal of the subframe

We remove the subframe to replace it if it is damaged (cracks, deformation, tears) or when removing the gearbox and dismantling the power unit as an assembly.

Perform the work over an inspection pit or on a ramp.

Remove the engine compartment splash shields—

of the engine compartment (see “Removing the engine compartment splash shields,” p. 283) and the powertrain protection

(see “Removing the powertrain protection,” p. 283).

On both sides of the vehicle, disconnect the subframe brackets from the front suspension arm mounting bolts and push the ball joint studs

out of the steering knuckle holes (see “Removing the control arm,” p. 203).

of the drive hubs (see "Removing the lever", p. 203).

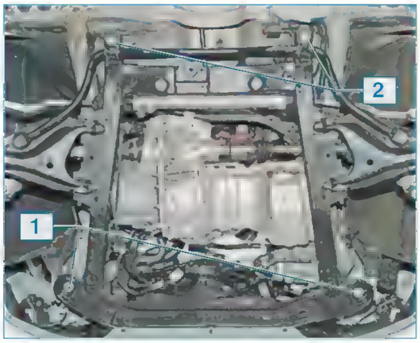
Unscrew the three bolts securing the front bumper to the subframe (see "Removing the front bumper on the Logan", p. 286).

Remove the rear engine mount bracket (see "Replacing engine mounts", p. 96).

Unscrew the two bolts securing the steering gear to the subframe and the bolt securing the power steering hose bracket on the left side of the subframe (see "Removing the steering gear", p. 218).

Disconnect the exhaust system downpipe from the exhaust manifold (see "Removing the exhaust system", p. 132) and withdraw the downpipe bracket from the exhaust system hanger (see "Replacing the exhaust system hanger", p. 132). Before loosening the subframe mounting bolts, place adjustable supports under it or support it with an assistant.

With an 18 mm socket we loosen...



...two bolts 1 of the front mounting and two bolts 2 of the rear subframe mounting to the body.

Remove the subframe assembly with the control arms and the front suspension anti-roll bar.

If necessary, remove the front suspension control arms from the subframe (see “Removing the control arm,” p. 203) and the anti-roll bar (see “Replacing anti-roll bar components,” p. 201).

Install the subframe in the reverse order. Tighten the subframe-to-body mounting bolts to the specified torque.

Front wheel hub bearing replacement

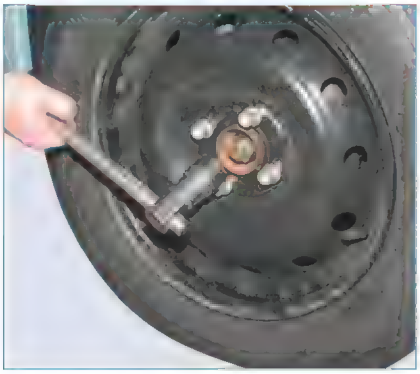
Replace the front wheel hub bearing when it fails or when removing the hub, since the bearing components will be damaged during this operation.

The work is carried out on an inspection pit or ramp.

The procedure is shown on the wheel hub bearing of a vehicle equipped with ABS. On a vehicle without ABS, the operations to replace the bearing are practically the same. The difference is the absence of the retaining ring for the wheel speed sensor, which on vehicles with ABS is located in the steering knuckle recess beneath the bearing.

The procedures for replacing the right and left wheel bearings are the same. Engage the parking brake, select first gear, and place chocks under the wheels.

! The wheel hub bearing nut is tightened to a high torque, so the socket and breaker bar must be strong enough to transmit the required force.



Use a 30 mm socket to loosen the wheel hub bearing nut.

If you cannot loosen the nut this way (the vehicle's wheel turns), you can have an assistant depress and hold the brake pedal to keep the vehicle from turning.

Raise the vehicle and remove the wheel.

Remove the front wheel speed sensor (see "Removing the Front Wheel Speed Sensor," p. 237).

Remove the brake disc and backing plate (see "Replacing the Front Wheel Brake Disc," p. 233).

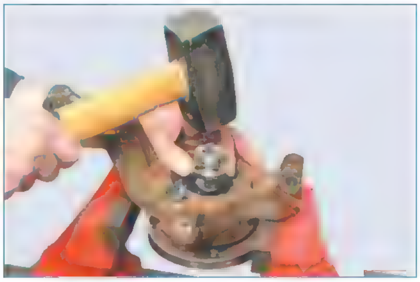
Disconnect the tie-rod end from the steering knuckle (see " Replacing the tie-rod end," p. 217). Withdraw the ball-joint stud from the hole in the steering knuckle (see "Removing the control arm," p. 203). Disconnect the strut from the steering knuckle (see " Removing the strut and disassembling it," p. 200)...

...and remove the steering knuckle assembly with the hub from the splined stub of the outer CV joint housing.

! When removing the left steering knuckle, do not apply force to the drive shaft directed along its axis outward from the vehicle, because

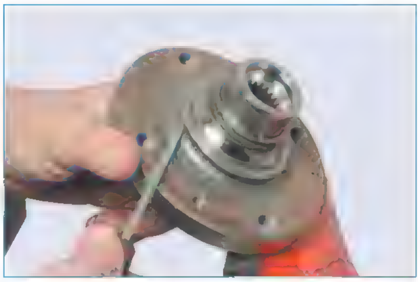
this may cause the rollers of the three-joint inner drive coupling to come out of the slots of the transmission half-shaft gear.

Support the steering knuckle on the jaws of a vise.



Strike the end of the hub with a drift or a suitably sized socket...

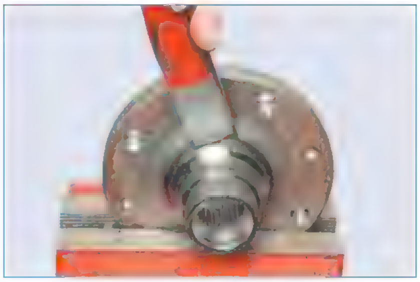
...we press the hub out. The inner ring of the bearing that is located closer to the hub flange remains on the hub.



Use a screwdriver to pry up the protective washer that covers the bearing seal...

...and remove the washer. Clamp the hub flange in a vise. Insert a chisel between the faces of the inner bearing race

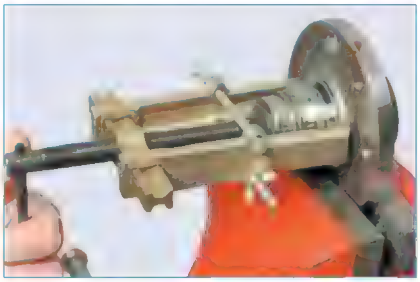
and the hub shoulder.



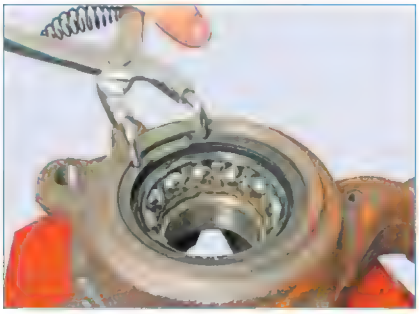
By striking the chisel with a hammer, we shift the inner bearing race along the hub.

of the bearing on the hub.

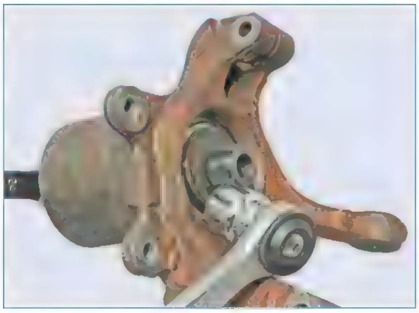
Then, into the resulting gap, insert the puller jaws...



...и finally pressing-
we press the inner bearing race
from the hub.

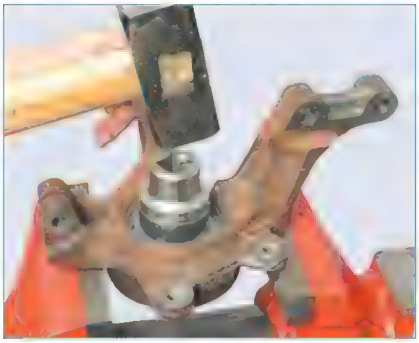


Using circlip pliers, remove the retaining ring of the bearing from the groove in the steering knuckle.



Press the bearing out of the steering knuckle using a cup puller.

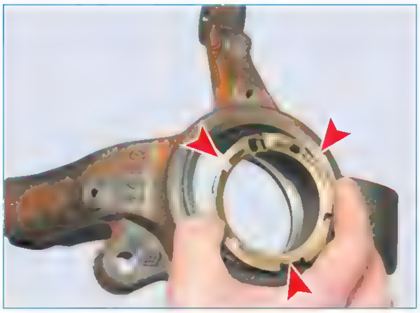
The bearing can also be driven out by impact. To do this, rest the knuckle on the jaws of a vise.



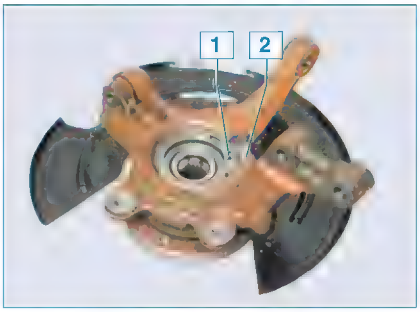
By striking the end of the bearing's outer race through a drift or a suitably sized socket, drive the bearing out of the knuckle.

Before installing the new bearing, clean the bore in the steering knuckle and the groove for the retaining ring. File out any chisel nicks on the hub with a rasp.

Before pressing in the bearing...



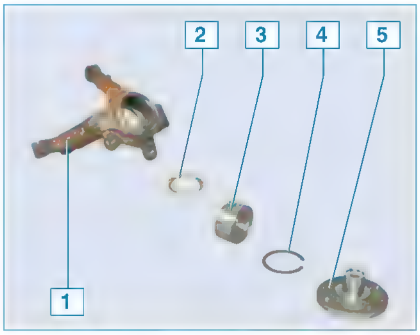
...insert the wheel speed sensor's locating ring into the steering knuckle bore (with the ring's tabs, which center it, facing into the knuckle).



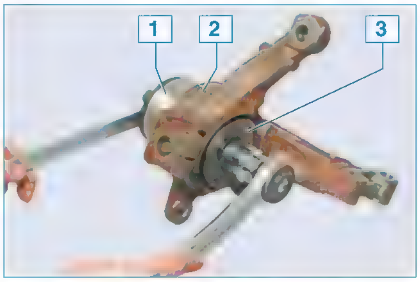
Orient the ring in the knuckle hole so that the speed sensor holder on ring 1 is positioned in the slot of the knuckle 2 (for clarity shown on the assembled hub assembly). With the cup puller screw and support washer installed...

...insert the new bearing into the knuckle hole.

! **The bearing should be installed so that its dark-colored protective washer (made of magnetic material) faces the mounting ring of the wheel speed sensor.**

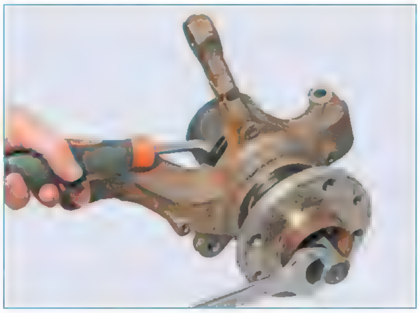


Components of the hub assembly: 1 – steering knuckle; **2** – mounting ring for the wheel speed sensor (absent on vehicles without ABS);**3** – hub bearing; **4** – retaining ring; **5** – wheel hub



Press the bearing in by applying force through the puller cup 1 to the face of the bearing outer race 2, while the puller washer 3 must bear against the steering knuckle.

After pressing in the bearing, install the retaining ring into the knuckle groove. Then press the hub into the bearing.

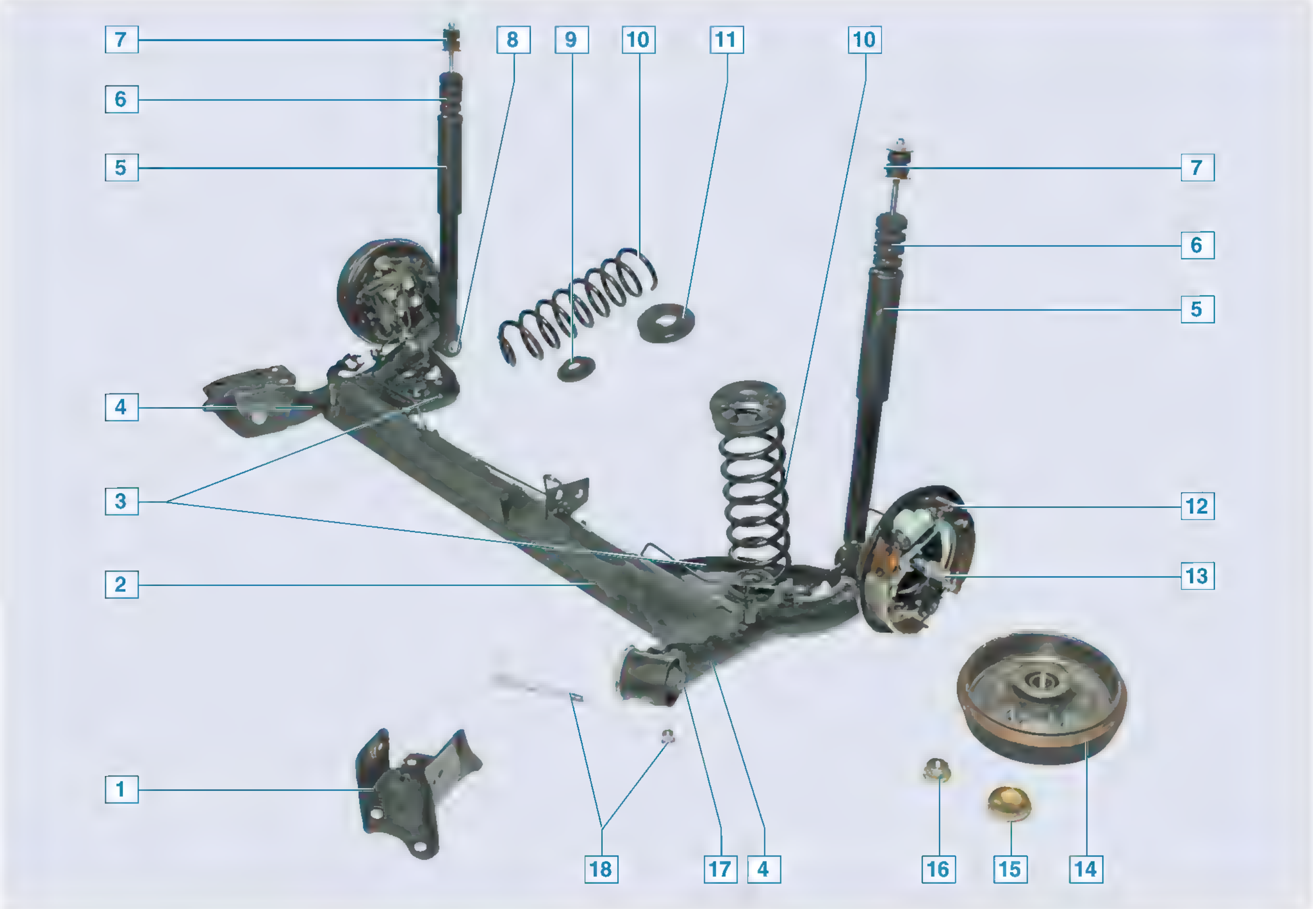


When pressing the hub in, the puller cup should bear against the end face of the bearing inner race.

Proceed with further assembly and installation of the hub unit in reverse order.

Rear suspension

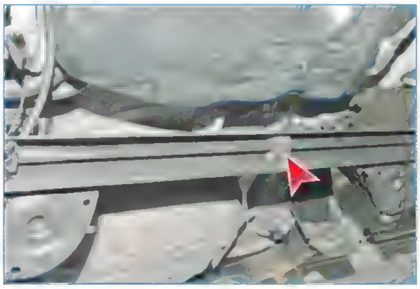
Description of the design



Rear suspension components: 1 – bracket for attaching the beam arm to the body; **2** – beam; **3** – arm bracket; **4** – beam arm; **5** – shock absorber; **6** – compression travel bumper; **7** – cushions and washers for the upper shock absorber mount to the body; **8** – bolt securing the shock absorber to the arm; **9** – lower spring seat; **10** – spring; **11** – upper spring seat; **12** – rear wheel brake mechanism; **13** – rear wheel stub axle; **14** – brake drum assembly with rear wheel bearing; **15** – dust cap; **16** – wheel bearing nut; **17** – beam arm silent-block; **18** – bolt and nut securing the beam arm to the bracket

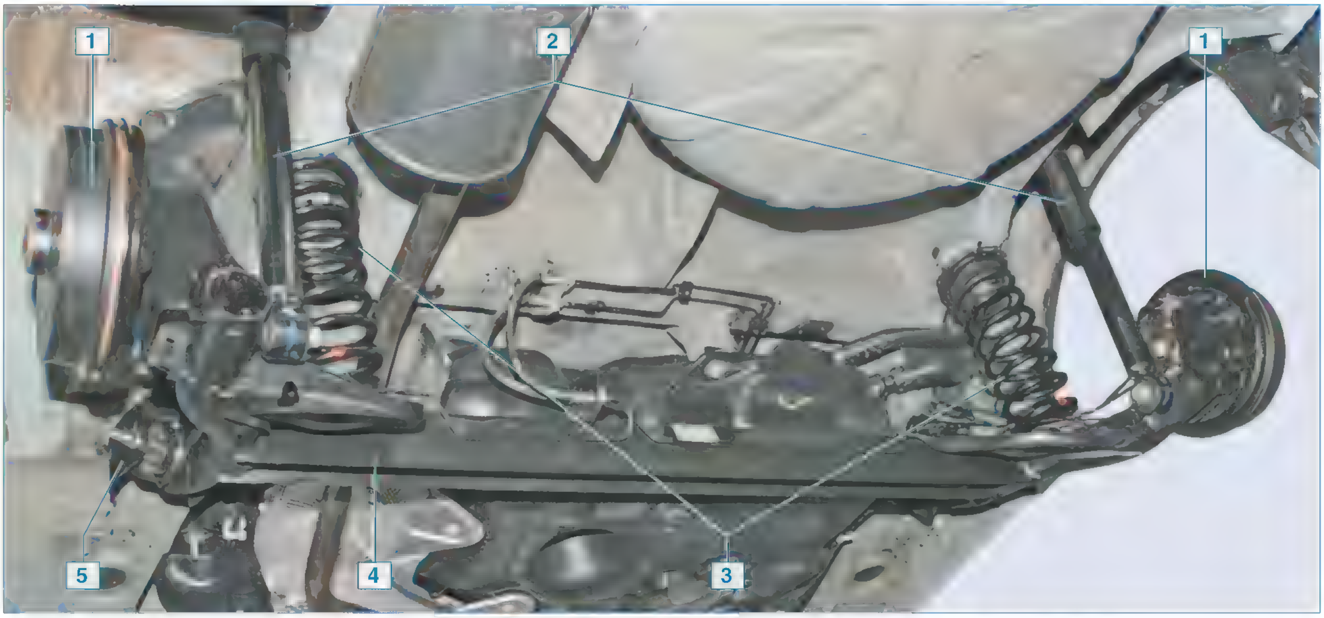
The rear suspension is a semi-independent design with an elastic beam, coil springs, and telescopic gas-filled double-acting shock absorbers.

Brackets for supporting the springs are welded to the beam and the levers. To increase lateral stability and reduce roll angles, a transverse stabilizer is installed inside the beam, the ends of which are welded to the supporting arms of the levers. The stabilizer is a tube — circular in cross-section at the ends and oval in the middle.

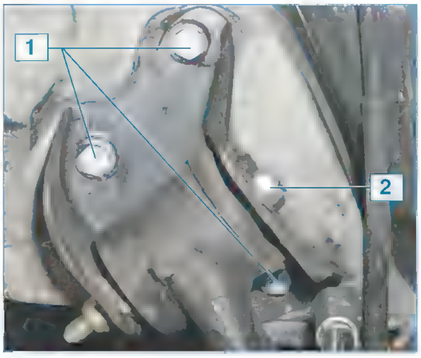


A rubber pad is installed on the stabilizer in the middle section

Flanges for attaching the rear wheel axles and brake backing plates are welded to the suspension arms. At the front, the arms are fitted with welded bushings containing pressed-in silent-blocks. The outer race of the silent-block is plastic, while the inner race is



Rear suspension: 1 – brake drum assembly; **2** – shock absorber; **3** – spring; **4** – rear suspension beam; **5** – bracket for mounting the beam arm to the body

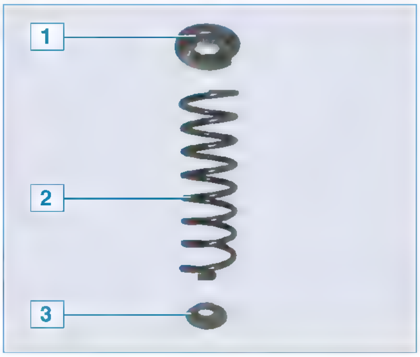


Bolt 2 passes through the inner sleeve of the silent block, connecting the control arm to the body bracket. The bracket is attached to the body with three bolts 1

metal. The rubber block of the silent block, vulcanized to the shells, is asymmetrical in cross-section. Therefore, when pressing the silent block into the control arm, it must be oriented precisely.

The elastic elements of the suspension are coil springs.

The spring rests on rubber pads: below on the lever bracket and above on the support welded to the vehicle body longitudinal member. The lower coil of the spring has a smaller diameter.

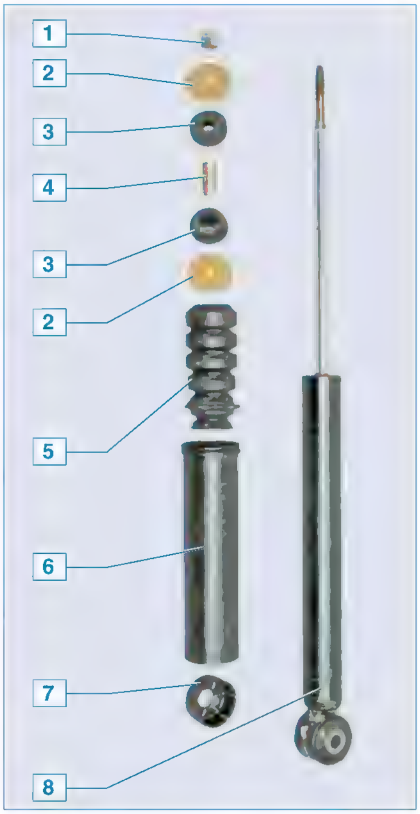


Rear suspension spring: 1 – upper pad; **2** – spring; **3** – lower pad

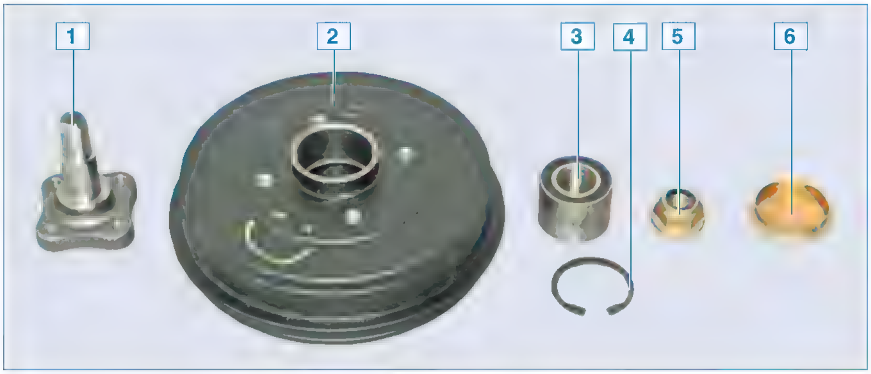
Rear suspension springs are classified by stiffness. The spring class is marked with paint. Springs of the same class must be installed on the right and left sides of the vehicle.

When replacing, it is recommended to install springs of the same class as those originally fitted to the vehicle.

A rubber-metal joint is pressed into the lower eye of the shock absorber; a bolt passes through its central sleeve, securing the shock absorber to the suspension arm. The shock absorber rod is attached to the kno-

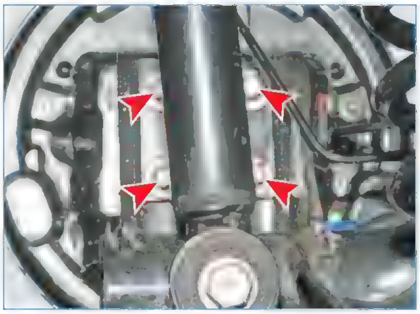


Rear suspension shock absorber: 1 – rod retaining nut; **2** – washer; **3** – rod bushing; **4** – spacer sleeve; **5** – compression travel bumper; **6** – boot; **7** – protective cap; **8** – shock absorber



Rear wheel bearing assembly: **1** – stub axle; **2** – brake drum; **3** – rear wheel bearing; **4** – bearing retaining ring; **5** – bearing nut; **6** – cap

are held by two rubber cushions (one under the mount, the other on top) and two metal washers. Between the cushions on the shock absorber rod there is a spacer sleeve that prevents the cushions from deforming excessively when the rod nut is tightened. A compression travel buffer is fitted on the shock absorber rod, to which the cover is attached.



The rear wheel spindle is fastened with four bolts through the brake shield to the flange of the rear suspension beam

The rear wheel bearings are double-row roller bearings. The brake drum serves as the rear wheel hub, and the outer ring of the bearing is press-fitted into the hole in the drum. The inner rings of the bearing are mounted on the rear wheel journal (axle) with a small clearance. The bearing in the drum is secured with a retaining ring. During operation the bearing does not require replenishment of lubricant.

The rear wheel alignment angles are set by the beam geometry and are not adjustable during operation. The angles can only be checked on a specialized stand and compared with the reference values (camber angle 0°51'±15', toe-in of the wheels +0°44'±15'). If the rear wheel alignment angles do not match the reference values, the condition of the rear suspension components must be inspected.

Removing the shock absorber

Remove the shock absorber if it has lost its working properties, the lower mounting silent block is damaged or severely worn, the upper mounting rubber cushions have failed, or the shock absorber cover or compression travel buffer is damaged. To ensure the left and right shock absorbers have matching performance, replace both shock absorbers. Perform the work on a level horizontal surface or over an inspection pit.

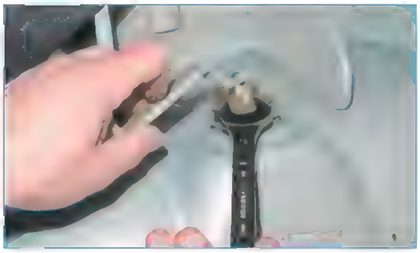
To avoid damaging the brake hose assemblies of the rear wheels, do not remove both shock absorbers at the same time when the rear of the vehicle is supported.

The procedure is shown for the left shock absorber; the right one is removed in the same way. After opening the trunk lid (Logan vehicle)...

...we lift the wheel arch trim.

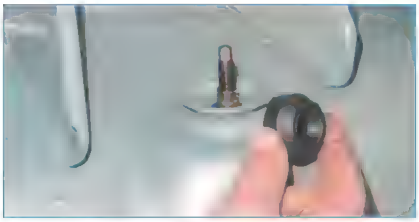
With the trunk lid open (Sandero and Sandero Stepway cars)...

...we remove the side trim.

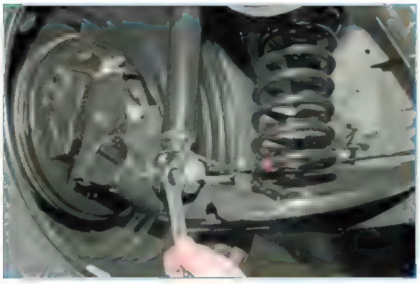


Using a 16 mm wrench, loosen the nut of the shock absorber upper mount, holding the shock absorber rod to prevent rotation with a special 6 mm wrench (you can use the wrench for the upper mount of the front shock absorbers from Zhiguli cars).

We remove the support washer...



...and the upper rubber mounting cushion of the rod.



Under the car, use an open-end wrench or an 18 mm socket to unscrew the bolt of the shock absorber's lower mounting to the beam arm...

...and remove the shock absorber assembly with the lower rubber cushion and spacer bushing, the lower support washer, the compression buffer, and the protective boot.

Replace any faulty parts with new ones.
Before installing the shock absorber, put the above-listed parts onto its rod.
Insert the upper end of the shock absorber into the body opening and start the bolt for the lower shock mounting. Place the upper rubber cushion and the support washer onto the shock rod, start the rod retaining nut, and tighten it.

Finally tighten the lower shock mounting bolt to the specified torque with the vehicle resting on its wheels.

Removing the spring

Springs are removed when they are being replaced, when the rubber spring pads are replaced, when the rear suspension beam is removed, and also when the entire exhaust system is dismantled (left spring).

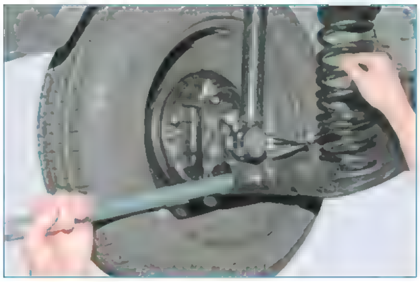
Perform the work in an inspection pit or on a ramp.

! **Springs must be replaced only in pairs.**

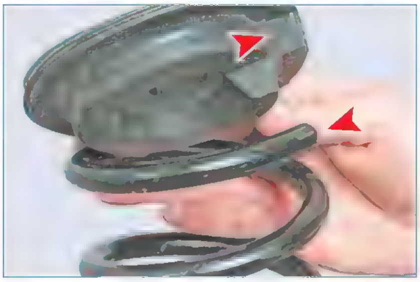
The removal is shown on the left spring; the right spring is removed in the same way.
Unscrew the bolt of the lower shock mounting to the rear suspension beam arm (see “Removing the shock absorber,” p. 209).

Raise the rear of the vehicle and securely support it on factory-made stands. Compressing the spring coils with two straps, remove the spring. The spring can also be removed without using straps; in that case, an assistant may be required.

Insert a length of pipe or a sturdy rod into the hole in the beam lever.

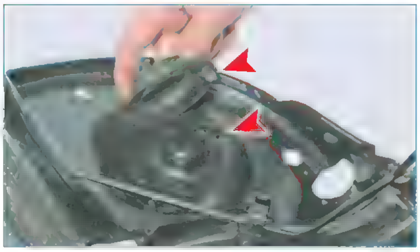


Pull the pipe section downward, pressing the beam lever, and remove the spring. Remove the lower and upper spring pads. The upper spring pad usually sticks to the body. Check the pads for any deformations or tears. Before installing the spring, fit the upper pad onto it so...

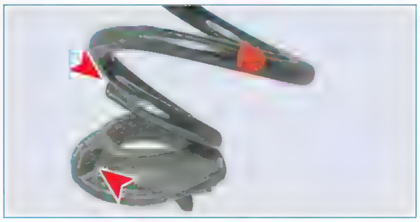


...so that the end of the upper spring coil rests against the lip of the spacer.

Then, to prevent the upper pad from shifting during spring installation, attach it to the spring with tape or insulating tape.
Install the lower spring spacer onto the projection of the lever bracket so that...



...the spacer pin enters the bracket hole (shown on the removed beam for clarity).



Fit the spring so that the end of its lower coil rests against the lip of the spacer (shown on the removed spacer for clarity).

Lowering the beam arm lever, place the upper end of the spring with its pad onto the protrusion of the body bracket.

Reassemble the rear suspension in the reverse order.

Replacing the silent -block beam arm

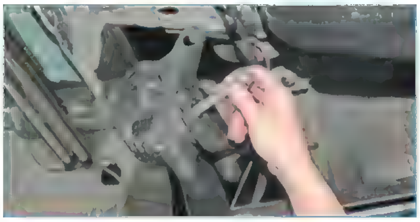
Replace the arm's silent block if the rubber of the joint shows tearing or delamination.
Work is carried out in an inspection pit or on a ramp.

We lift the rear of the vehicle and securely support it on factory-made stands.
The replacement of the silent block is demonstrated on the right control arm of the rear beam assembly.

Remove the wheel on the side of the silent block being replaced. Install an adjustable support under the right arm of the beam.

Pull the parking brake cable out of the eyelet on the beam bracket.

If the vehicle is equipped with an anti-lock braking system (ABS), pull the rubber boot of the speed sensor wiring harness out of the holder on the rear suspension arm (see "Removing the rear wheel speed sensor," p. 237). Disconnect the lower mounting of the shock absorber from the beam arm (see "Removing the shock absorber," p. 209). Unscrew the nut on the arm-to-bracket mounting bolt and the three bolts that secure the bracket to the body (see "Removing the rear suspension beam"). Lower the right side of the beam on the adjustable support until...

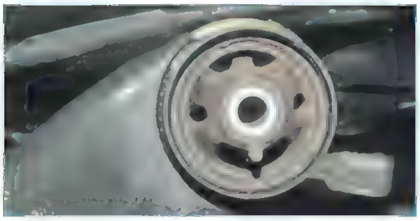


...until the fuel tank no longer obstructs the exit of the lever mounting bolt.

When lowering the beam, be careful to ensure that the rear-wheel brake hoses are not overly stretched.

After removing the bolt, take the bracket off the lever.

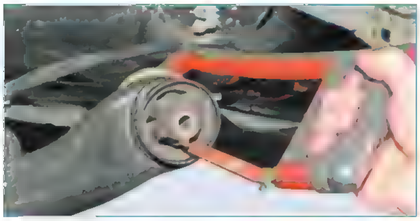
A significant portion of the loads on the lever's silent-block bushing is taken along the vehicle's axis...



...therefore the rubber mass of the silent block is asymmetric in cross section.

Before pressing out the silent-block bushing, mark the orientation of the components relative to the lever so that the new bushing can be pressed in in the same position.

The silent block is best pressed out of the arm with a special puller. If a puller is not available, removal can be eased by cutting the outer shell of the silent block.

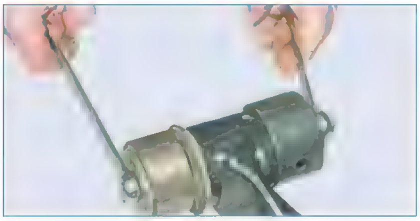


Insert the hacksaw blade into the hole in the rubber mass of the silent block and saw through the plastic outer sleeve of the silent block.

This will significantly reduce the tension of the silent block in the arm bore.

After that, using a drift or a section of pipe of the appropriate diameter, we drive the silent block out of the arm from the sill side, applying force to the outer sleeve.

Before pressing in the new silent block, we clean the hole in the arm. Insert the silent block into the arm hole, aligning it with the marks.



Press the silent block into the arm with a cup puller, applying force through a drift to the outer sleeve of the silent block (for clarity we show this on the removed beam).

Replace the left control arm's silent block in the same way, except for the operation of unscrewing the bolts that secure the bracket of the arm to the body — after loosening the nut on the bolt that attaches the left arm to the bracket, remove the bolt and withdraw the arm from the bracket's eye.

Install the rear suspension beam arms in reverse order. Finally tighten the nuts on the arm-to-bracket bolts to the specified torque with the vehicle on its wheels.

Removing the rear suspension beam

The beam is removed to be replaced if it is damaged.

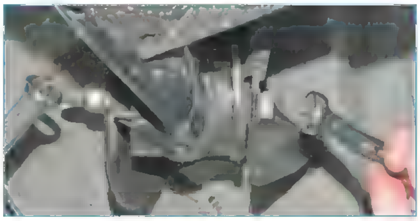
Perform the work with an assistant in an inspection pit or on a service ramp.

Remove the brake pads from the rear wheel brake assemblies (see "Replacing the rear wheel brake pads," p. 228). Disconnect the parking brake cables from the rear suspension beam (see "Replacing the parking brake cables," p. 235). Disconnect the rear wheel brake hoses from the brake lines located on the beam (see "Replacing the rear wheel brake hose," p. 234).

If the vehicle is equipped with ABS, disconnect the wheel speed sensors from the brake backings (see "Removing the rear wheel speed sensor," p. 237).

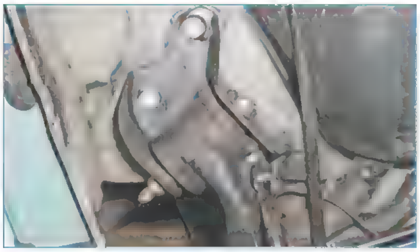
Place the adjustable stop under the beam.

Disconnect the lower shock absorber mounts from the beam arms (see "Removing the shock absorber," p. 209) and remove both rear suspension springs (see "Removing the spring," p. 210).

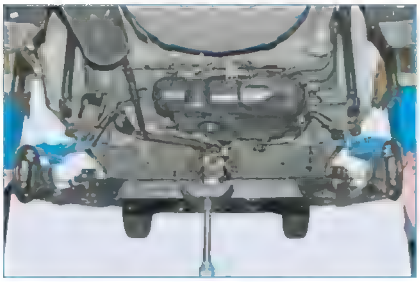


Using an 18 mm box wrench, loosen the nut on the left mounting bolt

of the beam arm to the bracket, holding the bolt with a wrench of the same size. Remove the bolt from the holes of the bracket and the silent block or drive it out with a drift made of soft metal. After unscrewing the nut of the bolt securing the right arm to the bracket, the bolt cannot be removed because it abuts the fuel tank. Therefore...



...use a 16 mm socket with an extension to loosen the three bolts securing the right arm bracket to the body. Remove the left beam arm from the bracket's eye...



...and lower the beam onto an adjustable support, holding it on both sides.

Remove the right arm bracket from the beam, the rear wheel brake shields, the brake lines, and the wheel knuckles.

Install the rear suspension beam—in reverse order.

! **Tighten the nuts on the bolts securing the control arms to the brackets finally to the specified torque with the vehicle in the "on its wheels" position.**

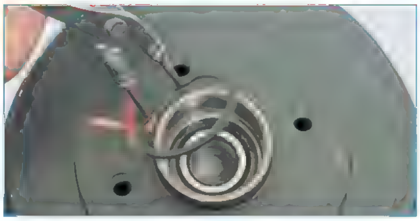
After installing the beam, bleed the brake hydraulic system (see " Bleeding the brake hydraulic system," p. 48).

Bearing replacement rear wheel

Replace the bearing when it fails — noise, howling near the rear wheel, or noticeable play. Perform the work on an inspection pit or ramp.

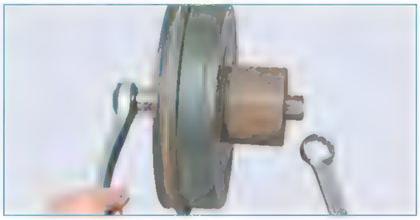
Fully lower the parking brake lever. Remove the rear wheel and disassemble the brake drum (see " Replacing the rear wheel brake shoes," p. 228).

! **After removing the brake drum, do not press the brake pedal, as the pistons may fully protrude from the wheel cylinder.**

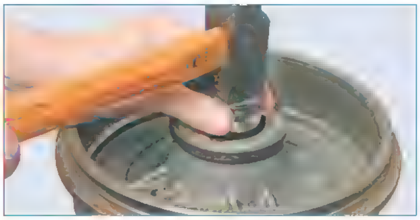


From the outside of the drum, use special circlip pliers for removing retaining rings to remove the bearing retaining ring.

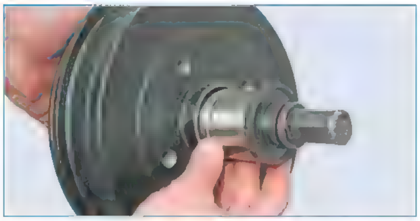
Press out the bearing that needs to be replaced from the drum housing...



...using a cup puller...

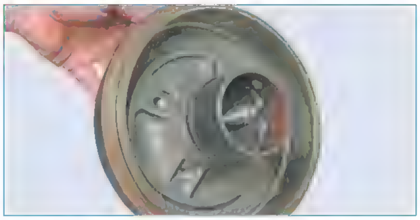


...or knock it out using a suitable drift, placing two wooden blocks under the brake drum. Before installing the new bearing, clean the seating surface for it in the brake drum. Insert the bearing into the drum bore.



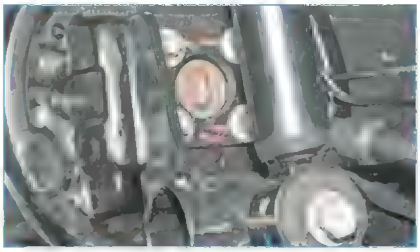
Press the new bearing in with a press tool until it stops, applying force through a drift to the bearing's outer race.

In this case, the outer race of the old bearing can be used as the drift.



When pressing the bearing in on a vehicle with ABS, support the puller cup from the opposite side of the drum and avoid damaging the tone ring of the rear wheel speed sensor.

Install the snap ring into the groove of the drum. Check the condition of the stub axle. If its bearing seating surface or the threads for the nut are damaged, replace the stub axle. To do this...

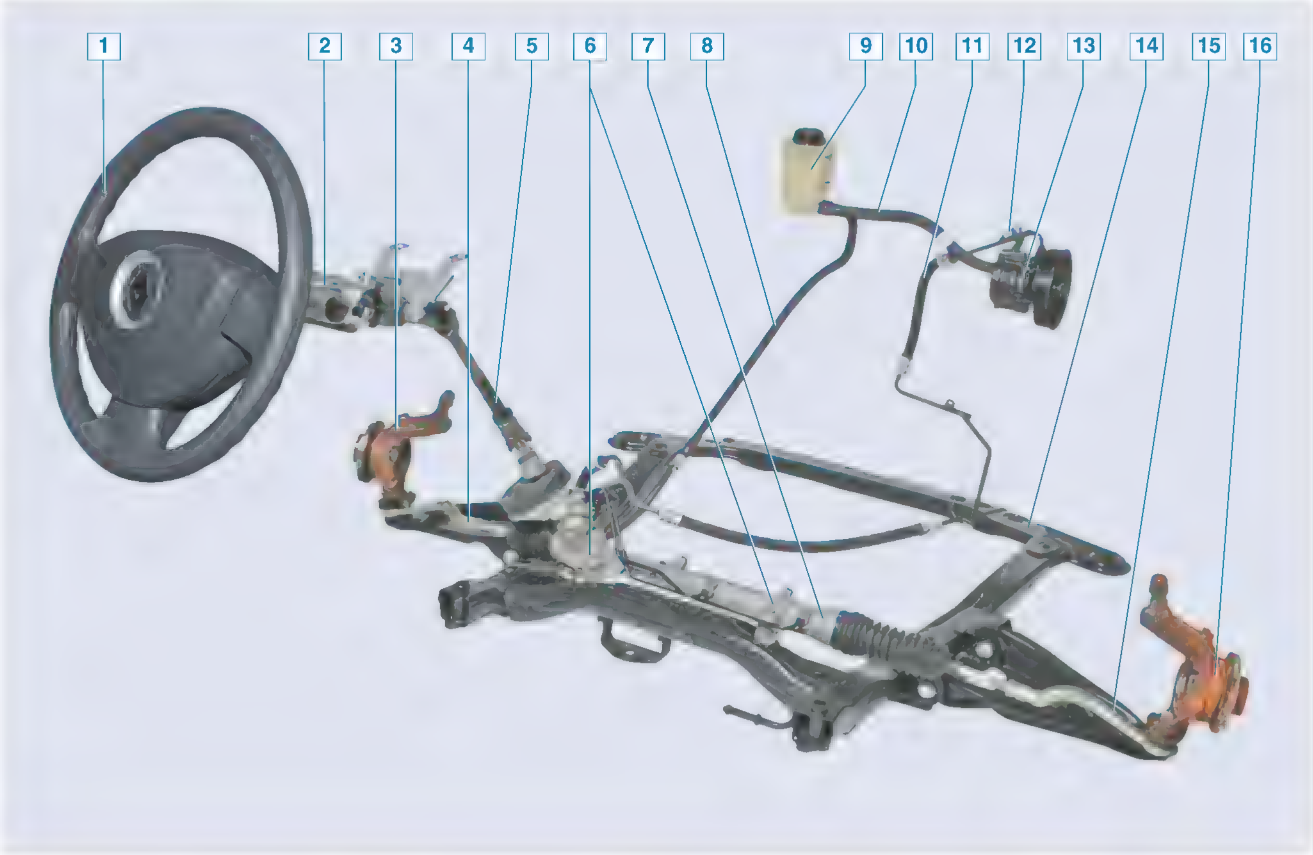


...using an E-16 socket, loosen the four bolts securing the rear wheel stub axle to the rear suspension beam flange......remove it and install the new stub axle.

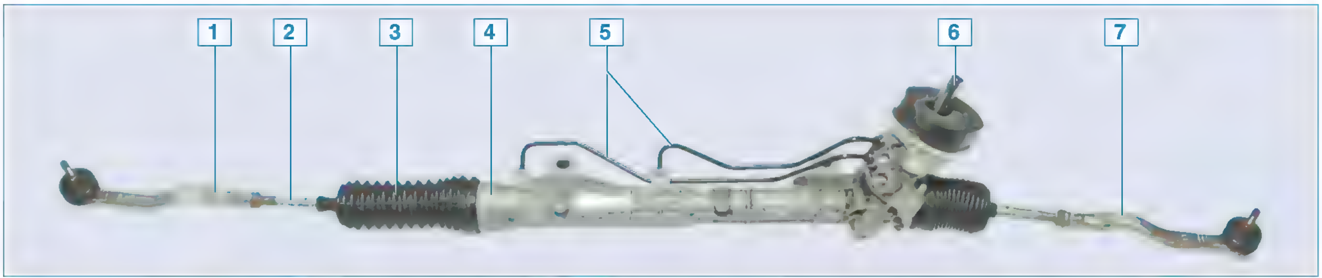
Mount the brake drum on the stub axle (see "Replacing the rear wheel brake shoe assemblies", p. 228).

Steering system

Description of the design



Steering system components of a power-assisted steering vehicle: **1** – steering wheel; **2** – steering column; **3** – left steering knuckle assembly with hub; **4** – left tie-rod end; **5** – intermediate shaft; **6** – bolts securing the steering gear housing to the subframe; **7** – steering gear housing; **8** – power steering return line; **9** – power steering reservoir; **10** – power steering filler line; **11** – power steering pressure line; **12** – power steering fluid pressure sensor; **13** – power steering pump; **14** – subframe; **15** – right tie-rod end; **16** – right steering knuckle assembly with hub

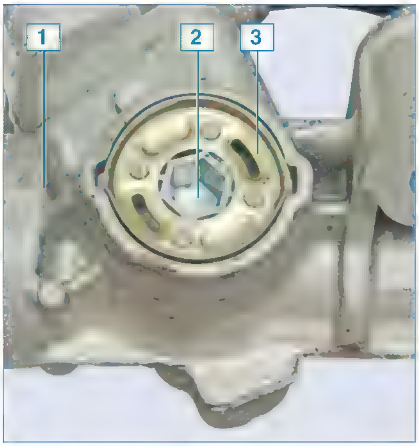


Power steering gear of the vehicle: **1** – right tie rod end; **2** – tie rod; **3** – rod boot;**4** – steering gear housing; **5** – power steering hoses; **6** – driven gear; **7** – left tie rod end

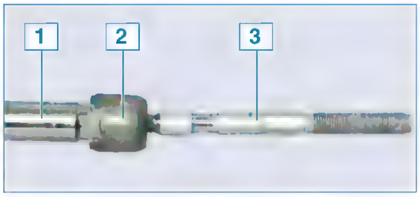
The vehicle's steering is rack-and-pinion with power assist. The steering mechanism is of the " pinion-and-rack" type.

A drive pinion is mounted in the steering mechanism housing on two bearings and meshes with the toothed rack. When the steering wheel is turned, the steering column shaft rotates, which is connected to the drive pinion via an intermediate shaft (with universal joints at its ends). The pinion moves the rack, which, through the tie rods with their end fittings and the connected steering knuckle arms, turns the vehicle's steered wheels.

The steering mechanism housing is attached to the subframe with two bolts. Inside the steering mechanism housing, the rack is pressed against the drive pinion by a stop. The lateral clearance between the pinion and rack is adjusted by turning an adjustment plug. This adjustment is performed only during assembly of the steering mechanism at the factory; the clearance is not adjustable during operation.

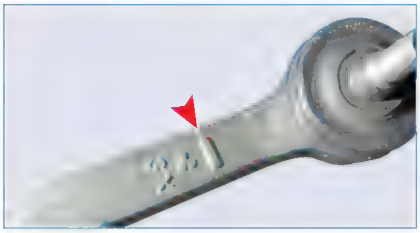


The adjustment plug 2 is secured to the housing of the steering mechanism 1 by a locking washer 3 riveted to the plug. The rim of the washer is pressed into the housing grooves in two places.

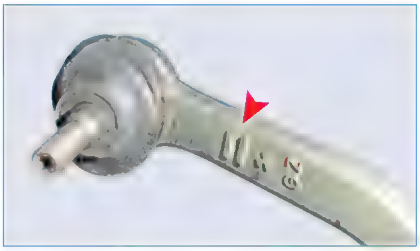


Steering tie rod assembly with the steering mechanism rack: 1 – rack; **2** – ball joint of the rod; **3** – steering tie rod

Steering tie rod end



One mark is applied to the right steering tie rod end...



...and on the left — two marks

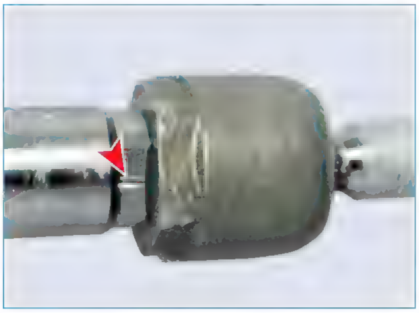
The steering drive consists of two tie rods connected to the steering rack and the lever-arms of the steering knuckles. Each rod is secured at the inner end to the steering rack by a non-serviceable ball joint — the threaded stud of the joint screws into the rack opening.

In the middle section of the tie rod there is a hexagon for a 13 mm wrench, and at the outer end there is a right-hand thread onto which the tie rod end is screwed.

The tie rod end contains a non-serviceable ball joint that does not require replenishing the grease, which is packed inside for the lifetime of the part.

The right and left steering rods are identical, while the studs are different. The connection between the steering-rack and the tie-rod ball joint is protected from dirt and moisture by a corrugated rubber boot. The boot is fastened with a plastic clamp to the steering-gear housing, and on the tie rod the boot is held by the elasticity of the rubber — the narrow band of the boot must align with the groove formed on the tie rod.

When assembling the steering mechanism at the factory, the threaded connection of the tie-rod ball-joint tip to the rack was locked to prevent unscrewing...

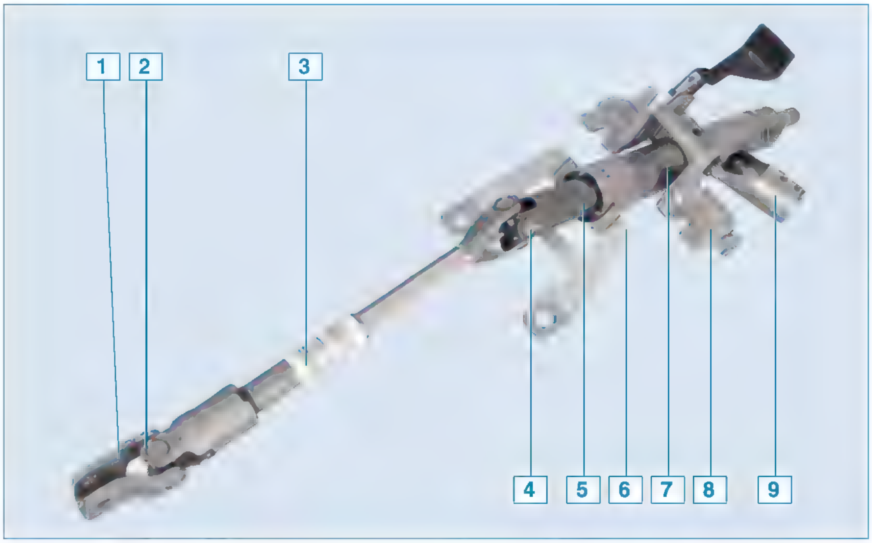


...by crimping the end of the rack.

Crimping the end of the rack alters the geometry of the threaded connection.

To replace the tie rod, you must unscrew the ball-joint tip from the hole in the rack (hex on the ball-joint housing for a 32 mm wrench and a flat on the end of the rack for an 18 mm wrench). In that case, the thread in the hole of the steering rack will most likely be damaged. If the thread damage in the steering rack hole is minor, it can be chased with a tap—otherwise it is better to replace the entire steering mechanism assembly.

The steering column is impact-safe, with a mechanism to adjust the steering wheel tilt.



Steering column: 1 – coupling; **2** – lower universal joint;**3** – intermediate shaft; **4** – upper universal joint; **5** – steering column shaft;**6** – lower column mounting bracket; **7** – tube; **8** – upper column mounting bracket; **9** – ignition switch socket

The steering column shaft is connected to the drive gear of the steering mechanism via an intermediate shaft with two universal joints. The intermediate shaft is made in sections to ensure impact safety. In a frontal collision, the steering column must not move toward the driver. This is achieved by a splined connection in the middle of the shaft. On the splines at the top of the steering column shaft the steering wheel is mounted and secured with a bolt. The steering column is attached to a crossbeam bracket located beneath the instrument panel.

Power steering pump

Some vehicles are equipped with a hydraulic power assist (power steering). The power steering system includes: the steering mechanism, a pump, a reservoir for the hydraulic fluid, and connecting lines. A fluid pressure sensor is installed in the pressure line to send a signal to the engine control unit.

The pump is driven by a belt from the auxiliary drive pulley. Hydraulic fluid from the reservoir enters the pump, and the pump supplies it at high pressure to the distributor unit located in a separate housing on the steering gear housing and mechanically connected to the steering column shaft. The distributor unit is designed to monitor any mismatch between the steering wheel rotation angle and the drive pinion shaft of the steering gear and to precisely vary the fluid pressure in the actuator chambers. A piston of the hydraulic cylinder is attached to the gear rack of the steering gear.

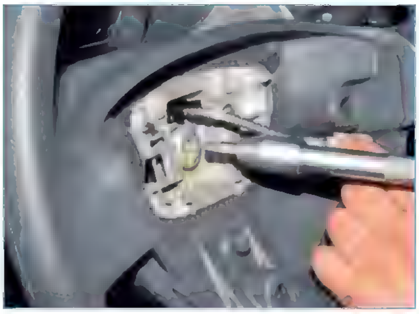
When the steering wheel is turned, the distributor connects one of the hydraulic cylinder chambers to the pump pressure line and the other chamber to the return. The piston of the hydraulic cylinder then moves the rack left or right due to the pressure differential of the working fluid, and through the tie rods and knuckle levers it turns the vehicle's steered wheels. If the power steering fails, the vehicle remains steerable, but the steering effort at the wheel increases.

To monitor the fluid level in the reservoir, MIN and MAX marks are applied to its translucent housing.

Removing the steering wheel

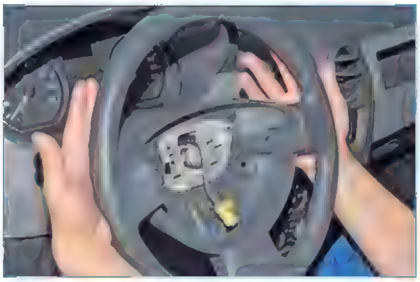
We remove the steering wheel for replacement, and also when dismantling the steering column switch connector, the steering column, or the instrument panel.

Set the vehicle's front wheels to the straight-ahead position. Remove the driver's airbag (see “Removing the driver's airbag,” p. 278).

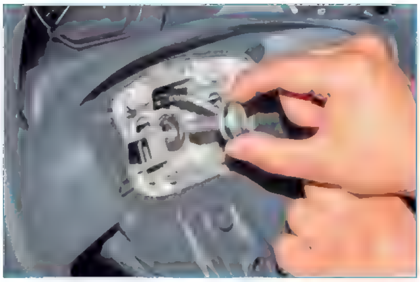


Use a Torx T-50 wrench to turn the steering wheel retaining screw several turns.

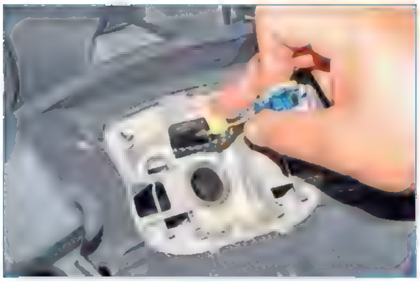
Do not fully unscrew the screw to avoid injury when removing the steering wheel.



Wiggling, pull the steering wheel toward you and slide it along the shaft splines.



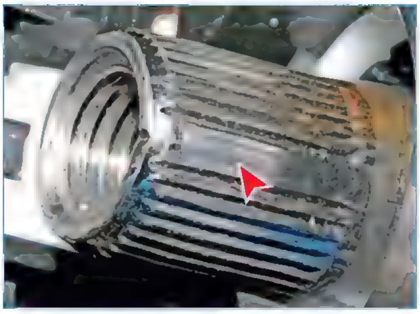
Completely unscrew the steering wheel retaining screw.



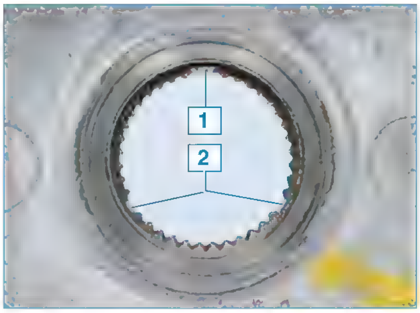
Thread the spiral cable of the airbag through the opening in the steering wheel hub...

...and remove the steering wheel from the shaft.

Install the steering wheel in the...
of the sequence.
The steering wheel is fitted onto the steering column shaft in only one position. To do this, you must align...



...a wide protrusion on the splined tip of the steering column shaft...

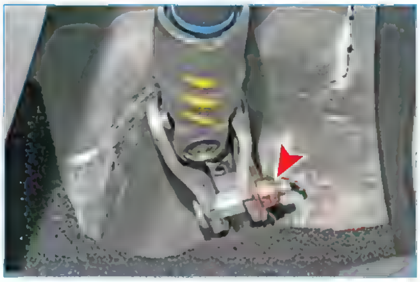


...with a wide groove 1 in the steering wheel hub hole.
At the same time, the two narrow slots 2 align with the corresponding protrusions of the steering column shaft tip.

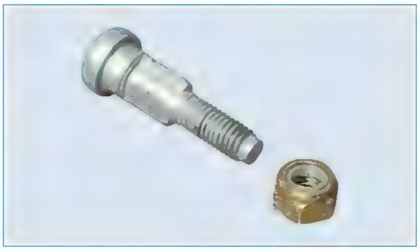
Removing the steering column

The steering column is removed as an assembly for replacement when the column shaft bearings or the universal joints of the intermediate shaft fail.

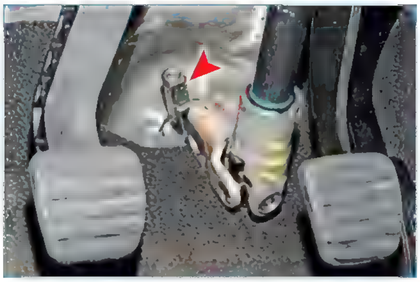
Remove the steering column switches (see “Removing the steering column switches and the switch connector from the clock-spring spiral cable assembly,” p. 267). Disconnect the wiring plugs for the ignition switch and the immobilizer coil from the wiring harness plugs (see “Replacing the immobilizer coil and ignition switch,” p. 247). Remove the instrument cluster (see “Removing the instrument cluster,” p. 276) to avoid damaging it when extracting the steering column through the opening in the instrument panel.



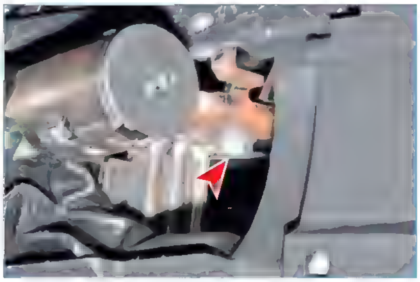
Using a 13 mm socket, loosen the nut on the special bolt that secures the lower universal joint coupling of the intermediate shaft to the pinion gear of the steering gear. Remove the bolt.



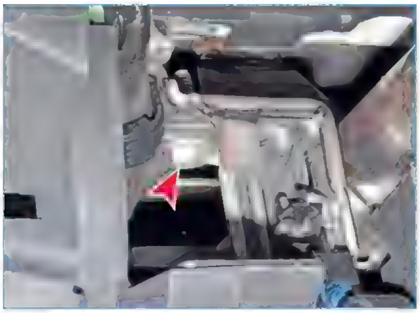
Special bolt and nut for securing the lower universal joint coupling of the intermediate shaft.



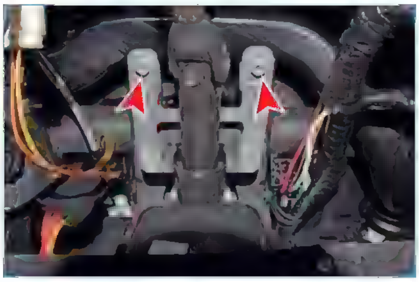
Removing the lower universal joint coupling from the gear (the flat on the gear is indicated by the arrow).



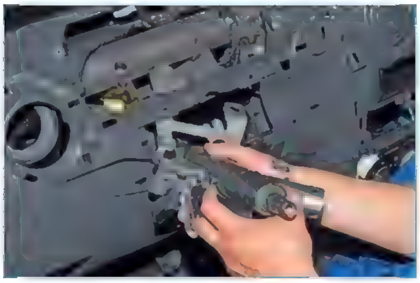
On the right side of the steering column, use a 13mm wrench to loosen the rear bolt securing the steering column bracket to the crossmember bracket.



Using the same tool, loosen the rear bolt on the left side of the steering column.



Use a 13 mm socket to loosen the two front mounting bolts of the bracket steering column columns to the crossbeam bracket located under the instrument panel.



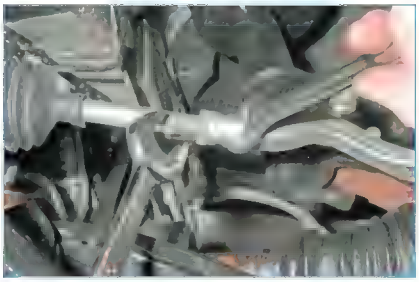
By moving the upper part of the steering column so that it does not catch on elements of the instrument panel and crossbeam, we remove the column through the opening in the instrument panel.

Install the steering column in reverse order.
Mount the lower driveshaft coupling onto the drive gear of the steering mechanism so that the coupling's fastening bolt aligns with the gear's flat. Tighten the coupling fastening nut and the steering column mounting bolts to the specified torque.

Replacing the steering tie rod end

Replace the tie rod end if its ball joint fails or if the joint boot is damaged. Remove the front wheel on the side of the tie rod end being replaced and securely support the vehicle on a factory-made stand.

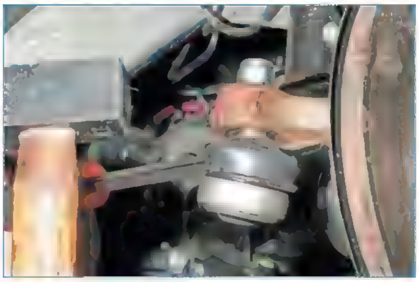
Turn the steering wheel fully to the side opposite the tie rod end being removed. The procedure is shown for the right tie rod end; the left tie rod end is replaced in the same way.



Using a 21 mm wrench, loosen the locknut while holding the tie-rod end flats with a 19 mm wrench.

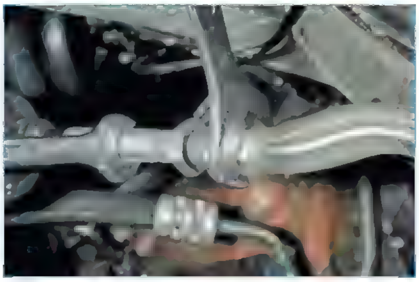
Before unscrewing the ball-joint pin retaining nut, clean the Torx hole in the end of the pin of dirt with a wire brush.

Using a 16 mm wrench, loosen the nut securing the tie rod end pin to the steering knuckle arm while holding the pin with a Torx T-30 wrench. Using a puller, press the ball joint stud out of the arm hole. If a puller is not available, loosen the stud nut not all the way. Insert a pry bar between the tie rod end and the steering knuckle arm.



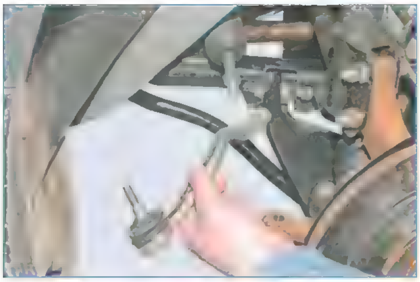
Prying the tie-rod end downward with a trim tool and striking the end of the steering knuckle arm with a hammer, drive the pin out of the hole in the arm. With the pin retaining nut fully loosened...

...withdraw the ball-joint pin from the hole in the arm.
Before unscrewing the tie-rod end, mark its position relative to the tie rod with a marker, or count the number of turns when unscrewing to note how far it was threaded in.
This will allow you to approximately preserve the previous wheel alignment settings.



Using a 19 mm wrench, loosen the end, holding the tie rod

to prevent rotation of the hex with a 13 mm wrench.



Remove the tie rod end.
Install the tie rod end in the reverse order. Screw it onto the threaded end of the tie rod the same number of turns (or to the marked position) as it was before removal. Tighten the locknut of the tie rod end and the nut securing the ball joint pin to the specified torques.

After completing the installation of the tie rod end, you must check and, if necessary, adjust the wheel alignment on a specialized alignment rack at a service station.

To adjust the wheel toe, loosen the tie rod end locknut and rotate the tie rod using a 13 mm hex wrench, holding the tie rod end with a 19 mm wrench (see above).

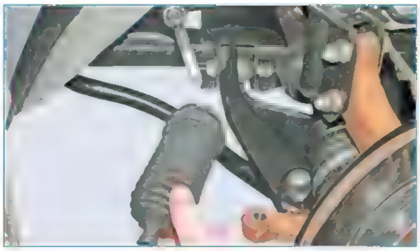
After adjusting the toe-in, tighten the tie-rod end locknut to the specified torque.

Replacing the steering rack boot

If the steering rack boot has lost elasticity, is cracked, or torn, it must be replaced. Remove the wheel on the side of the boot being replaced and securely support the vehicle on a manufacturer-approved stand.

Remove the tie-rod end (see " Replacing the tie-rod end," p. 217).

Cut off the plastic clamp securing the protective boot to the steering gearbox housing with side cutters.



Remove the protective steering rack boot.
Clean the tie-rod joint of dirt and install the new boot in the reverse order. Secure the boot with a new clamp.

Removal of the steering rack

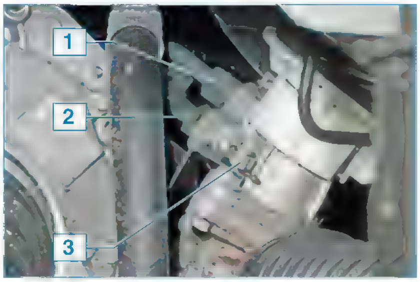
Remove the steering mechanism for repair or replacement.
The procedures are shown on a vehicle equipped with power steering.
Perform the work on an inspection pit or a service ramp.
Use a squeeze bulb to pump fluid out of the power steering reservoir. Disconnect the tie rod ends of both steering rods from the steering knuckles

(see "Replacing the tie-rod end," p. 217).
Inside the vehicle, disconnect the coupling of the universal joint on the intermediate steering column shaft from the driven gear of the steering mechanism (see "Removing the steering column," p. 218). Before disconnecting the hydraulic line pipes

from the steering gearbox housing un-
we place a wide container under the oil pan

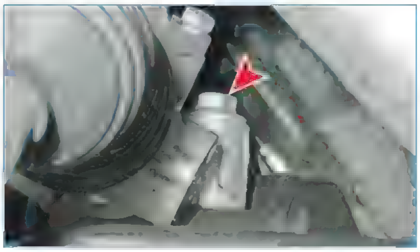
to collect the fluid.

Under the car, we unscrew...



...using a 13 mm wrench — nut 3 securing the bracket of the drain line tube, a 19 mm wrench — fitting 2 of the drain line tube, and a 17 mm wrench — fitting 1 of the pressure line tube.
Pull the tube ends of both lines out of the steering gearbox housing holes and insert plugs of suitable diameter into the tube and housing holes.

plugs of suitable diameter.



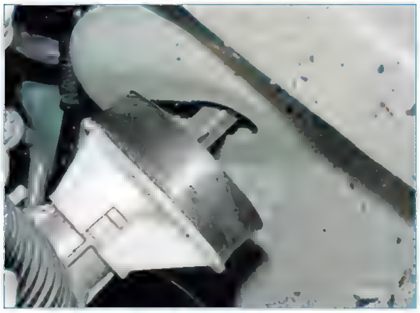
From the left side, use an 18 mm socket to unscrew the bolt securing the steering gearbox to the subframe.

Similarly, turn the bolt securing the steering mechanism to the subframe on the right side. Remove the rear engine mount (see "Replacing the engine mounts", p. 96).

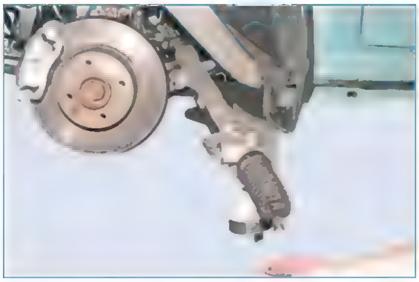
Push the powertrain forward
(in the direction of travel)...

...and place a wooden block 300–350 mm long between the engine oil-pan and the subframe.

By lowering the steering mechanism...



...we withdraw the drive pinion of the steering mechanism from the hole in the front bulkhead.



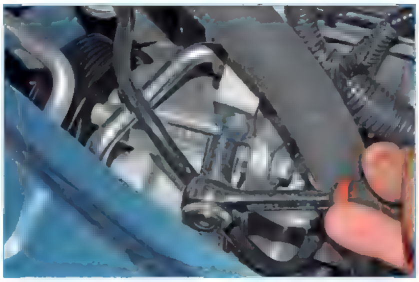
Remove the steering mechanism to the left. Install the steering mechanism in reverse order. Before installation, check that the rack is set to the center position. To do this, use slip-joint pliers to turn the drive pinion of the steering mechanism on the flat until it stops in either direction, then turn the pinion the other way by 1.5 turns.

Fill the power steering reservoir with hydraulic fluid and remove air from the system (see “Bleeding the power steering system,” p. 220).

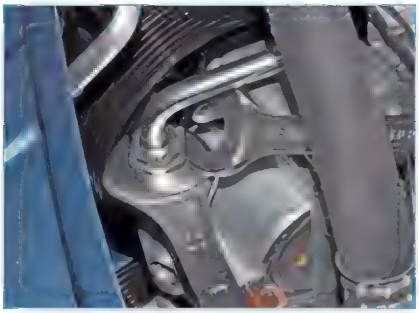
Removing the power steering pump

The power steering pump is removed for replacement or when removing the engine. Remove the auxiliary drive belt (see “Replacing the auxiliary drive belt for 1.4–1.6 (8V) engines”, p. 32; “Replacing the auxiliary drive belt for 1.6 (16V) engines”, p. 41).

Remove the left headlight (see “ Removing the headlight on the Logan,” p. 256; “Removing the headlight on Sandero and Sandero Stepway,” p. 258).
Use a rubber bulb to draw fluid out of the power steering reservoir.

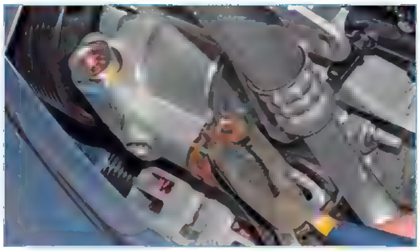


Use a 10 mm socket to loosen the bolt securing the clamp of the pressure line.



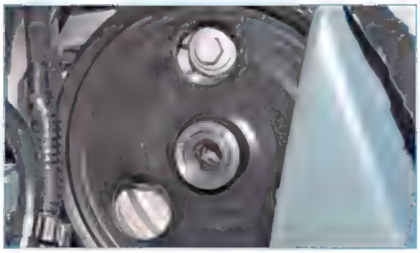
Holding the pump fitting with a 22 mm wrench, use a 17 mm wrench to unscrew the fitting of the pressure line tube.

Pull the tube fitting out of the pump fitting hole and move the tube away from the pump housing.

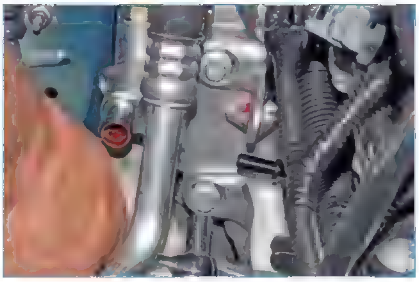


Squeezing the clamp securing the filler line with pliers, slide the clamp along the hose.

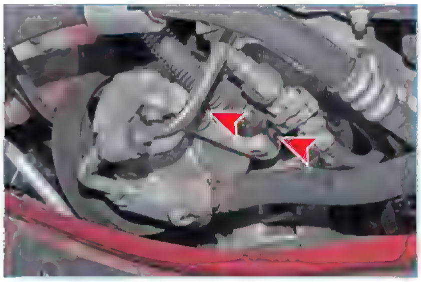
Remove the hose from the pump fitting. Insert plugs of the appropriate diameter into the openings of the tube, the hose, and the pump housing fittings.



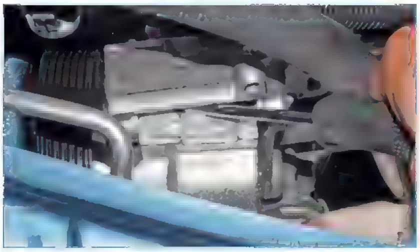
By rotating the pump pulley, align the hole in the pulley with the head of one of the two pump mounting bolts to the engine bracket. Using a 10 mm socket, loosen the bolt that secures the pump to the engine bracket. Similarly, loosen the second bolt.



Using the same tool, loosen the two bolts securing the pump on the opposite side of the bracket (vehicle with 1.6 (16V) engine).



On vehicles with a 1.4–1.6 (8V) engine, the pump is fastened on the side opposite the bracket with two screws, which we loosen with a Torx T-40 wrench.



Inserting a screwdriver between the pump housing and the engine bracket, pry the pump housing away from the bracket...

...and remove the pump.

Install the power steering pump in the reverse order.

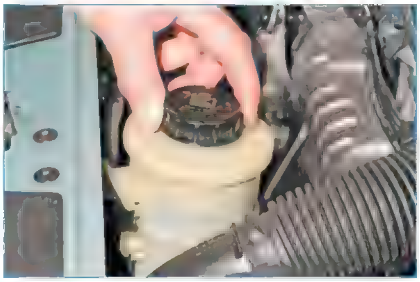
Adjust the drive belt tension for the auxiliary units (see “Replacing the auxiliary drive belt for 1.4–1.6 (8V) engines”, p. 32; “Replacing the auxiliary drive belt for 1.6 (16V) engines”, p. 41).

Fill the power steering reservoir with hydraulic fluid and bleed the air from the system (see “Bleeding the power steering system”).

Power Steering System Bleeding

Bleeding the power steering system is necessary to remove air that entered the hydraulic drive during repair or replacement of individual system components. Air in the hydraulic drive reduces the effectiveness of the power steering.

To bleed the hydraulic system on a non-running cold engine...



...open the power steering reservoir cap...

power steering...

...and top up the reservoir to the MIN mark (see “Checking the level of fluid in the power steering reservoir", p. 49).

Start the engine and check the fluid level in the reservoir at idle. If the fluid level drops, top it up to the MIN mark. Turn the steering wheel several times fully left and right, making sure the reservoir level stays around the MIN mark, and top up the fluid if necessary.

Return the steered wheels to the straight-ahead position and let the engine run for another two to three minutes. Then turn the steering wheel fully left and right again and, if necessary, top up the reservoir to the MIN mark.

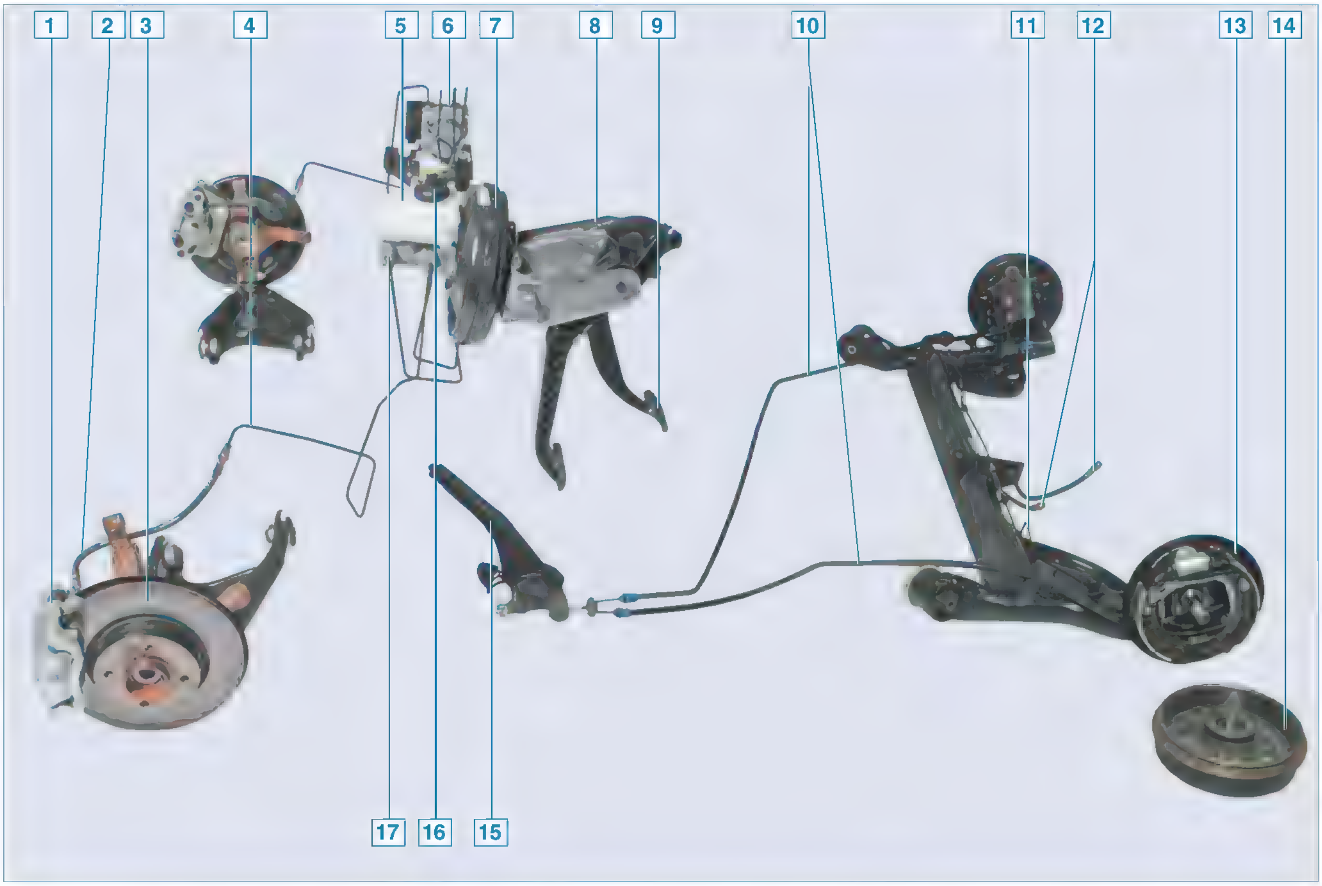
Stop the engine and check the fluid level in the reservoir again. After warming up and the working fluid temperature stabilizes, its level should be at the MAX mark, and when cold it should not fall below the MIN mark.

Close the power steering fluid reservoir cap.

Normal power steering operation should not be accompanied by increased noise, and there should be no visible air bubbles in the fluid. The effort required to turn the steering wheel with the engine running should be significantly less than when the engine is off. Noise from the power steering when the front wheels are turned to the stop is not a malfunction.

Brake system

Design description



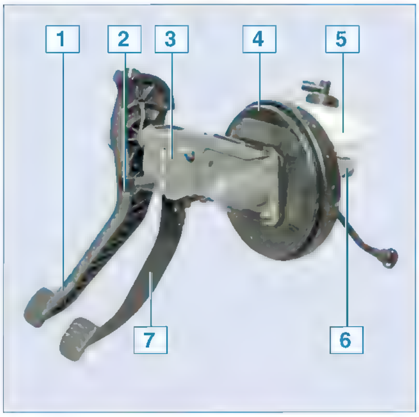
Brake system components of a vehicle with an anti-lock braking system (ABS): 1 – floating caliper;**2** – front wheel brake hose; **3** – front wheel brake disc; **4** – front wheel brake pipe; **5** – hydraulic reservoir; **6** – ABS unit; **7** – brake vacuum booster; **8** – pedal assembly;**9** – brake pedal; **10** – rear parking brake cable; **11** – rear wheel brake pipe; **12** – rear wheel brake hose; **13** – rear wheel brake mechanism; **14** – rear wheel brake drum; **15** – parking brake lever; **16** – brake fluid level warning sensor; **17** – master brake cylinder

The service braking system is hydraulic, dual-circuit with diagonal circuit separation. In normal operation (when the system is functioning) both circuits operate. If one circuit fails (loses pressure), the other provides vehicle braking, though with reduced effectiveness.

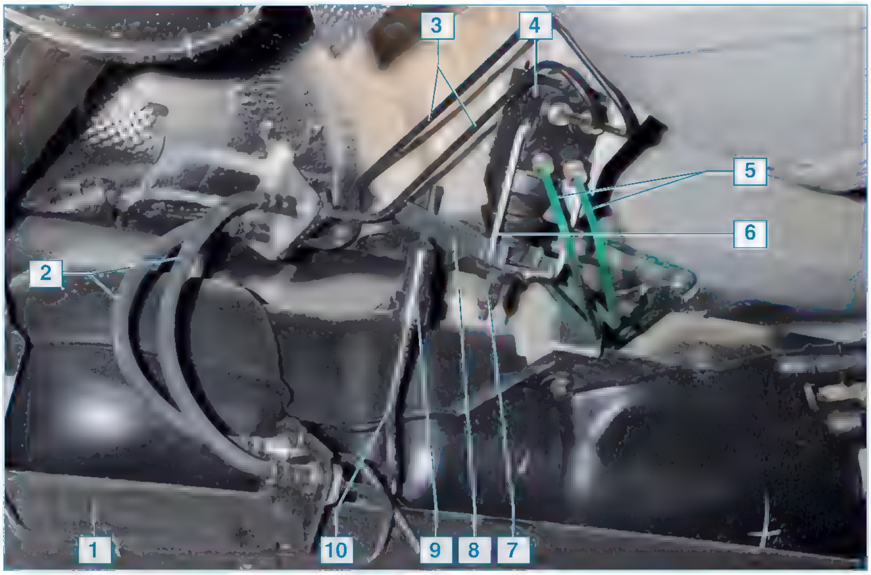
The service braking system includes the wheel brake mechanisms, the pedal assembly, the vacuum booster, the master brake cylinder, the hydraulic reservoir, the rear-wheel brake pressure regulator (only on vehicles without ABS), the ABS unit, and the connecting tubes and hoses.

The brake pedal is of the suspended type. A brake light switch is mounted on the pedal assembly bracket in front of the brake pedal—its contacts close when the pedal is depressed.

The brake vacuum booster is located in the engine compartment between the pedal pushrod and the master brake cylinder



Pedal assembly assembled with vacuum booster and master brake cylinder: 1 – clutch pedal; **2** – brake light switch; **3** – pedal assembly bracket; **4** – vacuum brake booster; **5** – hydraulic system reservoir; **6** – master brake cylinder;**7** – brake pedal

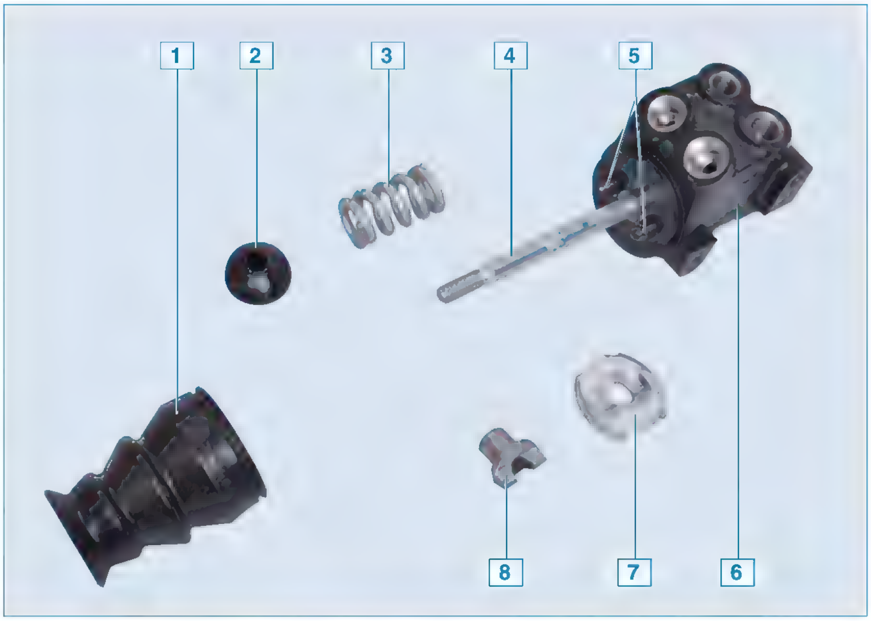


Location of the pressure regulator in the hydraulic drive of the rear wheel brake mechanisms: 1 – rear suspension beam; **2** – brake hoses of the rear wheels; **3** – brake lines of the rear wheels; **4** – pressure regulator; **5** – brake fluid supply lines to the pressure regulator; **6** – regulator bracket; **7** – adjusting nut of the regulator stud; **8** – actuating lever; **9** – adjustable sleeve of the rod; **10** – rod

and is fastened with four nuts through the front shield to the pedal bracket. The vacuum booster is non-serviceable; if it fails, it is replaced.

The master brake cylinder is attached to the vacuum booster housing on two studs. A reservoir for the brake hydraulic system is mounted on top of the cylinder, containing the fluid reserve. The reservoir housing is marked with maximum and minimum fluid level indicators, and a sensor is installed in the reservoir cap that activates a warning light in the instrument cluster if the fluid level falls below the MIN mark. When the brake pedal is depressed, the pistons of the master cylinder move, creating pressure in the hydraulic system that is delivered via pipes and hoses to the wheel brake actuators' wheel cylinders.

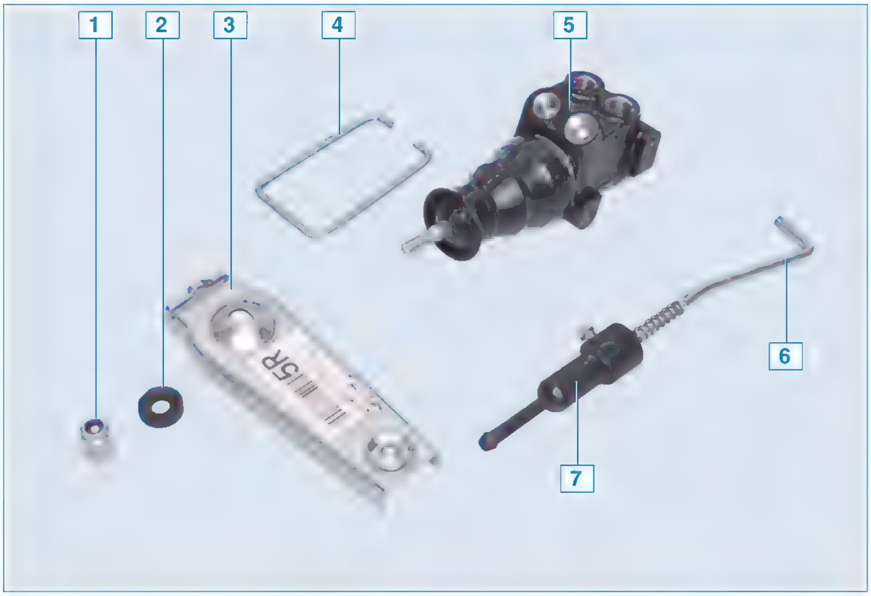
On a vehicle without ABS, the fluid to the rear wheel brake mechanisms is delivered through a pressure regulator located on t he vehicle floor pan, between the rear suspension beam and the stamping for the spare wheel.



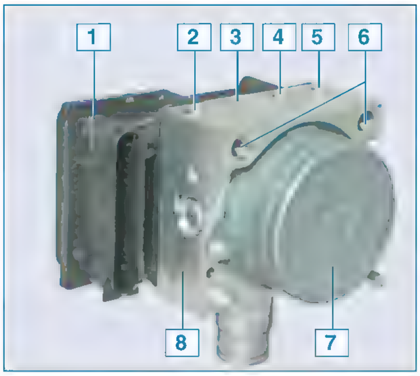
Components of the rear wheel brake pressure regulator: 1 – dust cover; **2** – support bushing; **3** – spring; **4** – pressure regulator stud;**5** – pressure regulator pistons; **6** – pressure regulator housing; **7** – thrust washer;**8** – guide bushing

As the load on the rear axle of the vehicle increases, the regulator rod connected to the rear suspension beam is loaded, transmitting force through the actuating lever to the stud and then to the two pistons of the regulator.

When the brake pedal is depressed, the fluid pressure tends to push the pistons out of the regulator housing.



Brake mechanism pressure regulator for rear wheels with levers: 1 – adjusting nut; **2** – plastic bushing; **3** – actuating lever; **4** – regulator bracket;**5** – pressure regulator; **6** – regulator rod; **7** – rod adjustment sleeve



ABS unit: 1 – control unit; **2** – port for connecting the brake line of the front right wheel; **3** – port for connecting the brake line of the rear left wheel; **4** – port for connecting the brake line of the rear right wheel; **5** – port for connecting the brake line of the front left wheel;**6** – port for connecting the master brake cylinder line; **7** – pump;**8** – hydraulic block

outward, which is resisted (by a spring) by the force from the regulator rod. When the system reaches equilibrium, the valve located in the regulator cuts off the supply of fluid to the wheel cylinders of the rear-wheel brake mechanisms, preventing any further increase in braking force on the rear axle and preventing the rear wheels from locking ahead of the front ones. When the load on the rear axle increases and the rear wheels' grip on the road improves, the regulator supplies higher fluid pressure to the wheel cylinders of the rear-wheel brake mechanisms; conversely, when the load on the rear axle decreases (for example, during the vehicle's "nodding" under heavy braking), the pressure is reduced.

Some vehicles are equipped with an anti-lock braking system (ABS), which provides more effective braking by reducing hydraulic pressure in the wheel brake mechanisms at the moment they begin to lock. It prevents skidding of the vehicle and maintains controllability.

On a car with ABS, fluid from the master brake cylinder flows into the ABS unit, and from there is delivered to the braking mechanisms of all wheels.

The ABS unit, mounted in the engine compartment on the right frame rail near the firewall, consists of a hydraulic block, a modulator, a pump, and a control unit.

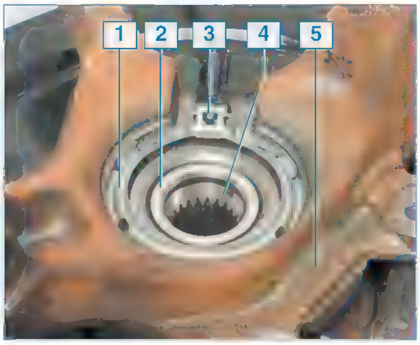
The ABS operates based on signals from inductive-type wheel speed sensors.

The front wheel speed sensor is located in the wheel hub assembly — inserted into the groove of a special mounting ring of the sensor, clamped between the end face of the outer race of the hub bearing and the shoulder of the steering knuckle bore for the bearing.

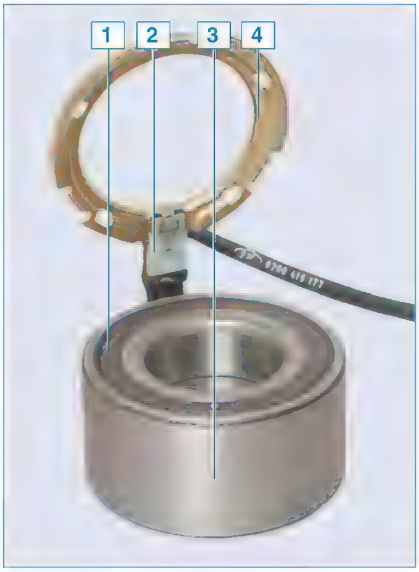
The tone ring of the front wheel speed sensor is the protective washer of the hub bearing, located on one of the bearing's two end faces. This dark-colored washer is made of a magnetic material.

On the other end face of the bearing there is a conventional light-colored protective washer made of tinplate.

The rear wheel speed sensor is mounted on the brake mechanism shield, and the sensor's tone/trigger wheel is a ring made of magnetic material pressed onto the flange of the brake drum.

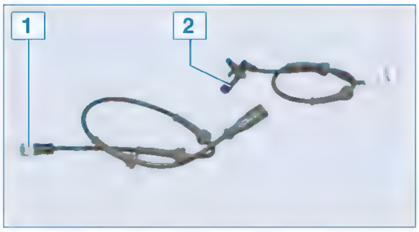


Location of the front wheel rotation speed sensor in the hub assembly: 1 – sensor mounting ring; **2** – inner ring of the hub bearing; **3** – wheel rotation speed sensor; **4** – wheel hub;**5** – steering knuckle



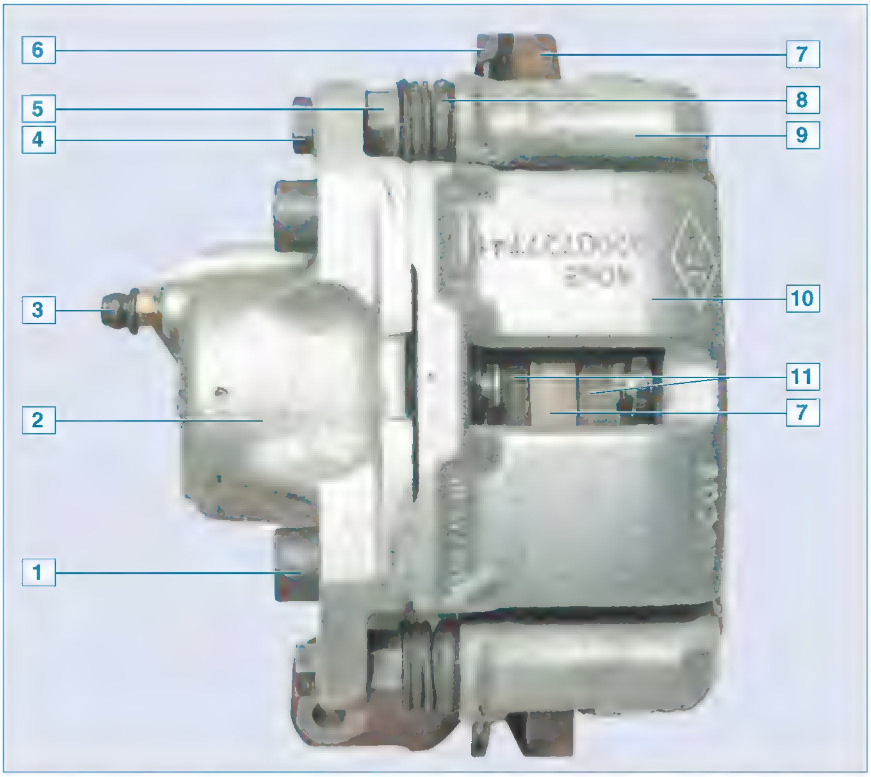
Front wheel speed sensor components: 1 – bearing protective washer; **2** – speed sensor;**3** – hub bearing; **4** – speed sensor retaining ring

Location of the target disc of the rear wheel speed sensor : 1 – brake drum;**2** – speed sensor target disc



Front 1 and rear 2 wheel speed sensors

When the car brakes, the ABS control unit detects the onset of wheel lockup and opens the corresponding solenoid valve of the modulator to release the pressure of the hydraulic fluid in the line.

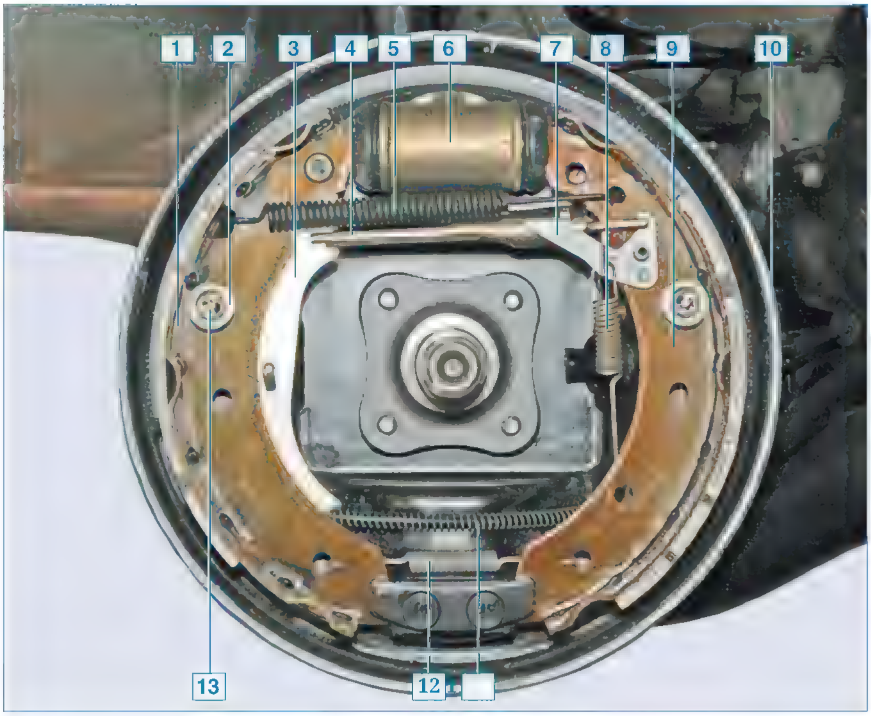


Front wheel brake assembly: 1 – bolt securing the cylinder housing to the caliper; **2** – wheel cylinder housing; **3** – brake hydraulic bleed fitting; **4** – bolt securing the bracket to the guide pin; **5** – guide pin; **6** – brake backing plate; **7** – brake disc; **8** – guide pin boot; **9** – pad guide; **10** – caliper; **11** – brake pads

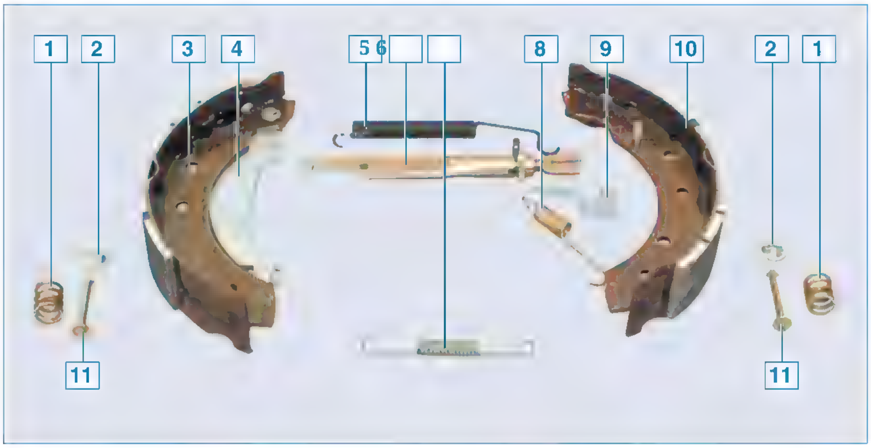
The valve opens and closes several times per second, so you can confirm the ABS is working by a slight vibration of the brake pedal during braking. If a fault occurs in the ABS, the braking system remains operational, but wheel lockup may occur. In that case, the control unit records a corresponding fault code in its memory, which can be read with special equipment at a service center.

The front-wheel braking mechanism is a disc type with a floating caliper, which includes a bracket and a single-piston wheel cylinder fastened together with two bolts. The front-wheel brake mechanisms of cars with engines of 1.4 L and 1.6 L displacement are identical. Some of the cars

Front wheel brake mechanism components: 1 – bolt securing the bracket to the guide pin; **2** – wheel cylinder housing; **3** – piston dust boot; **4** – guide pin; **5** – guide pin protective cap; **6** – pad guide;**7** – caliper; **8** – piston



Brake mechanism of the rear wheel with the drum removed: **1** – rear brake shoe; **2** – spring cup; **3** – parking brake actuating lever; **4** – expander (adjuster) bar; **5** – upper return spring; **6** – wheel cylinder; **7** – adjuster lever; **8** – adjuster spring; **9** – front shoe; **10** – backing plate; **11** – parking brake cable; **12** – lower return spring; **13** – support stud



Components of the rear wheel brake mechanism: **1** – shoe hold-down spring; **2** – spring cup; **3** – rear shoe; **4** – parking brake actuating lever; **5** – upper return spring; **6** – expander (adjuster) bar; **7** – lower return spring; **8** – adjuster spring; **9** – adjuster lever; **10** – front shoe; **11** – support stud

is equipped with brake mechanisms with ventilated discs.

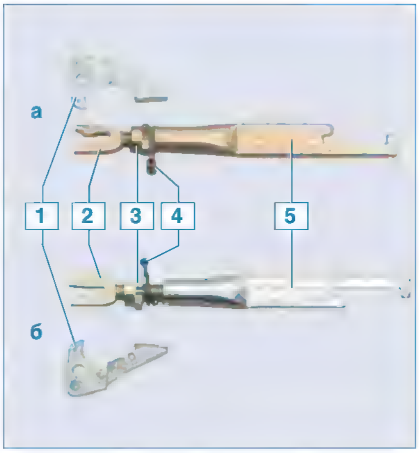
The brake pad guide is attached to the steering knuckle with two bolts, and the caliper is fastened with two bolts to the guide pins installed in the guide pad holes. Protective rubber boots are fitted on the pins. Into the pin holes of the guide A plastic grease is applied to the guide of the pads. The brake pads are held in the pad guide slots by springs. During braking, the fluid pressure in the brake mechanism's hydraulic drive increases and the piston, extending from the wheel cylinder, presses the inner brake pad against the disc. Then the caliper (as the guide pins move in the pad guide holes) shifts relative to the disc, pressing the outer brake pad against it. A piston with a rectangular-section rubber seal is installed in the cylinder housing attached to the caliper. Thanks to the resilience of this seal, a constant optimal clearance between the disc and the brake pads is maintained.

The rear wheel braking mechanism is a drum type with a two-piston wheel cylinder and two brake shoes, featuring automatic adjustment of the clearance between the shoes and the drum. The rear brake mechanisms on cars with 1.4 L and 1.6 L engines are identical.

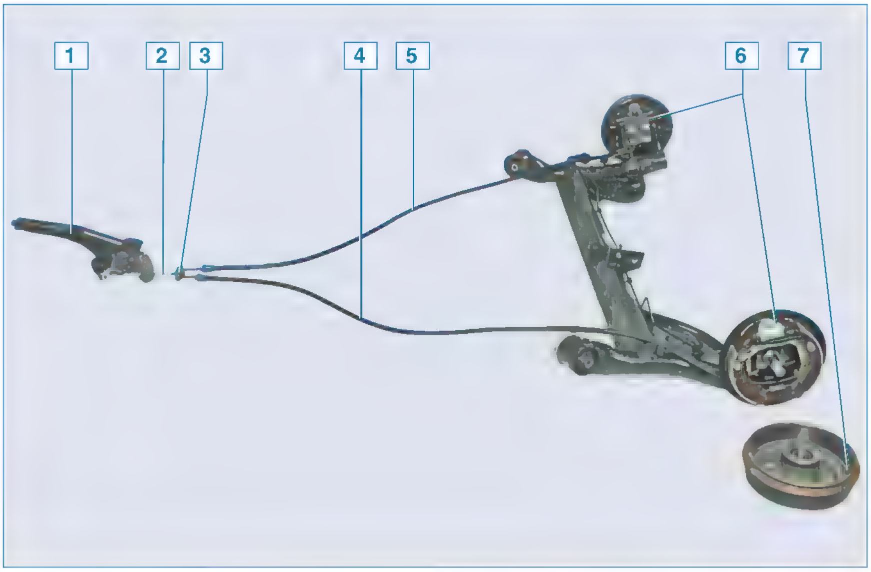
The brake drum is integrated with the rear wheel hub.

The automatic clearance adjustment mechanism consists of a segmented expanding shoe spacer, a regulator lever, and its spring. The automatic adjustment mechanism begins to operate when the clearance between the shoes and the brake drum increases.

When the brake pedal is pressed, the pistons of the wheel cylinder push the shoes outward to press against the drum, and the protrusion on the regulator lever moves along the recess between the teeth of the ratchet nut. With a certain wear of the shoes and when the brake pedal is pressed, the regulator lever has enough travel to



Elements of the automatic adjustment mechanism for the clearance between the shoes and the drum: a – right wheel brake assembly; **b** – left wheel brake assembly; **1** – regulator lever; **2** – threaded end of the expander bar; **3** – ratchet nut; **4** – spring retainer; **5** – expander bar



Parking brake components: 1 – lever; **2** – front cable; **3** – cable equalizer; **4** – left rear cable; **5** – right rear cable; **6** – rear wheel brake assembly; **7** – drum

turn the ratchet nut by one tooth, thereby increasing the length of the expanding bar and simultaneously reducing the clearance between the shoes and the drum. Thus, the gradual lengthening of the expanding bar automatically maintains the clearance between the brake drum and the shoes. The wheel cylinders of the rear wheel brake mechanisms are identical. The front shoes of the rear-wheel brake mechanisms are identical, while the rear ones differ — they have non-removable parking brake actuator levers installed in mirror symmetry.

The spacer bar and the ratchet nut of the left wheel brake mechanism are silver-colored (the ratchet nut and the tip of the spacer bar have right-hand threads), while those of the right wheel are gold-colored (the ratchet nut and the tip of the spacer bar have left-hand threads). The levers of the brake adjusters for the left and right wheels are mirror-symmetric. The right lever is marked “69,” and the left one is marked “68.”

The parking brake is manual, mechanical, cable-operated, and acts on the rear wheels. It consists of a lever, a front cable with an adjustment nut on its end fitting, an equalizer, two rear cables, and levers in the rear wheel brake mechanisms.

The parking brake lever, mounted between the front seats on the floor tunnel, is connected to the front cable. A compensator is attached to the rear end of the front cable; the front ends of the rear cables are inserted into its holes. The rear cable ends are connected to the parking brake actuator levers mounted on the rear shoes.

During operation (until the rear brake shoes are almost completely worn), no adjustment of the parking brake mechanism is required, since the extension of the brake mechanism's expander plate compensates for shoe wear. The parking brake drive needs to be adjusted only when the brake shoes, cables, or the parking brake lever are replaced.

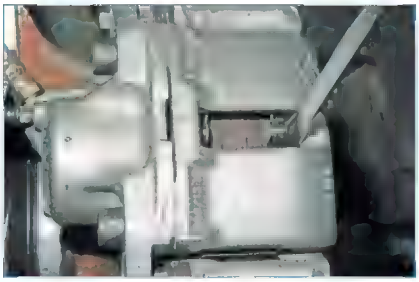
Replacement of front wheel brake shoe pads

Replace the shoes when their lining wear reaches the allowable limit — the minimum thickness of the shoe, including its backing, must be at least 6 mm. Shoes must also be replaced when the brake drum is replaced, if the linings are contaminated with oil, if there are deep grooves, cracks, or chips in them, or if the lining has separated from the shoe backing.

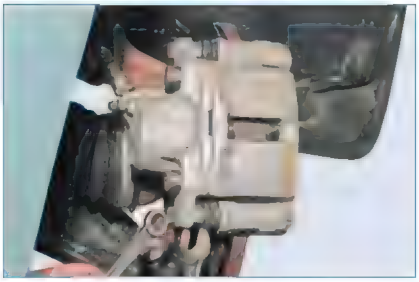
! **The front wheel brake shoe pads must be replaced only as a set – all four pads. Replacing the pads on only one brake assembly may cause the vehicle to pull to one side under braking.**

If the brake hydraulic reservoir fluid level is at the MAX mark, before installing new pads use a syringe or rubber bulb to draw fluid out of the reservoir part of the fluid. This operation must be performed so that when the piston is "pushed down" into the wheel cylinder of the brake assembly during the installation of new pads, fluid does not spill out from under the reservoir cap.

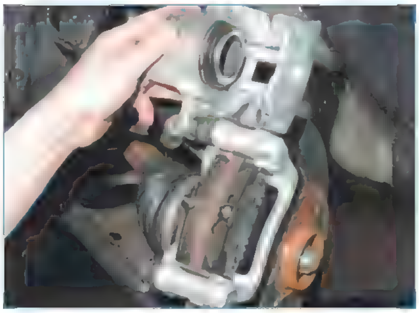
Remove the front wheel. Before installing new pads, you must push the wheel cylinder piston as far back into the cylinder as possible. To do this, insert a wide-blade screwdriver through the opening in the caliper between the base of the outer pad and the caliper and rest it against the caliper...



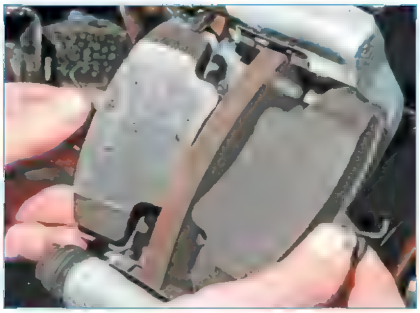
...move the bracket, pressing the piston into the cylinder.



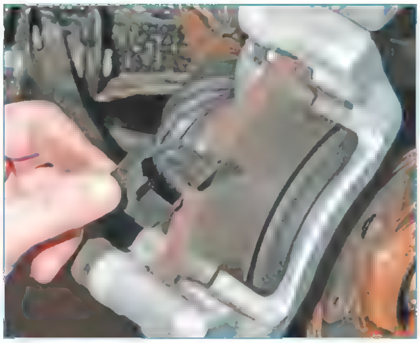
Use a 13mm box wrench to loosen the bolt securing the bracket to the lower guide pin while holding the pin with a 17mm open-end wrench.



Lift the bracket...



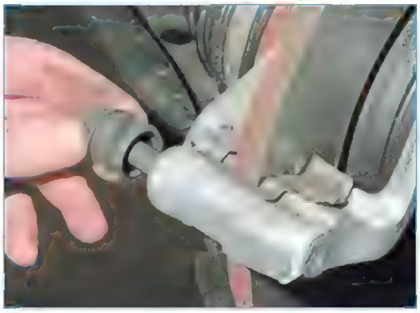
...we remove the brake pads from their guide.



Remove the two spring clips from the brake pads.

Use a wire brush to clean dirt and corrosion from the pad seating areas in their guide.

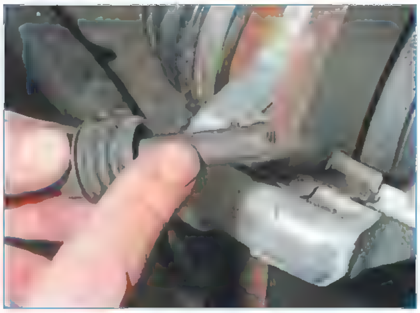
Before installing the new brake pads, check the condition of the protective boots covering the guide pins. Replace any boot that is torn or has lost its elasticity. To do this...



...we pull the guide pin out of the guide hole of the pad...

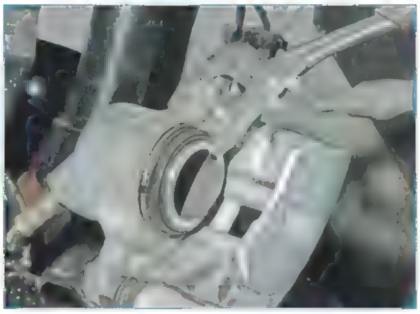
...and replace the boot (to replace the boot on the upper guide pin you need to unscrew the bolt fastening the bracket to the pin and remove the bracket from the pad guide).

Before installing the pin, apply a small amount of grease into the guide bore of the brake pad...



...and apply a thin coat of grease to the pin surface.

Install the new brake pads into the pad guide and lower the caliper bracket. If the portion of the piston protruding from the wheel cylinder prevents the caliper from being mounted onto the brake pads, raise the bracket...



...and use adjustable pliers to push the piston back into the cylinder.

Repeat the pad replacement on the opposite side of the vehicle. After replacing the pads, press the brake pedal several times to set the clearance between the pads and the rotors. Check the fluid level in the reservoir and top it up if necessary.

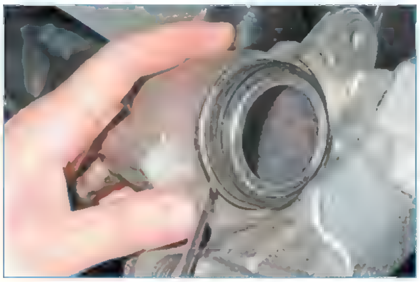
During use, the surface of the brake rotor can become uneven, reducing the contact area between new, not-yet-bedded-in pads and the rotor. Therefore, for the first 100 km after replacing the pads, while the new pads are bedding in, exercise caution, as the vehicle's braking distance may increase.

Replacing the Protective Boot of the Front Wheel Brake Piston

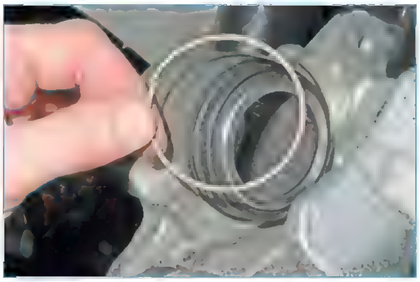
Replace the piston protective boot if it is damaged — cracked, torn, or has lost its elasticity.

Remove the front wheel brake pads and press the wheel cylinder piston back into the cylinder (see " Replacing the Front Wheel Brake Pads", p. 226).

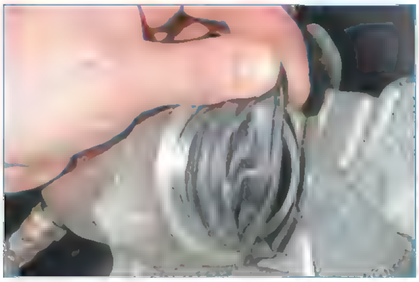
Clean the area around the boot from dirt.



Pry up screwdriver locking cover ring...



...and remove it.



Remove the cover from the flange of the cylinder housing and from the piston.

Use a bristle brush to clean the piston and the cylinder housing lip, then rinse with brake fluid. Wipe the surfaces with a clean, lint-free cloth.

Install the new protective cover in the reverse order.

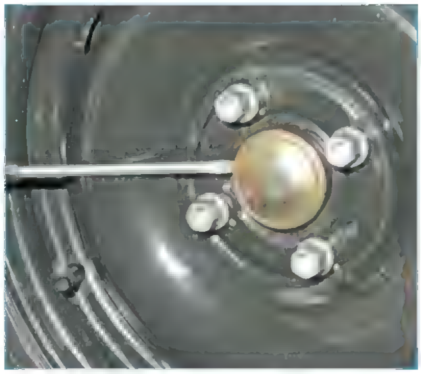
Replacement of rear wheel brake shoes

Replace the brake shoes when the linings or the brake drum of the rear wheel mechanism reach the maximum allowable wear. The shoes must also be replaced if the linings are contaminated with oil, have deep grooves or chips, or if the linings have detached from the shoe backing.

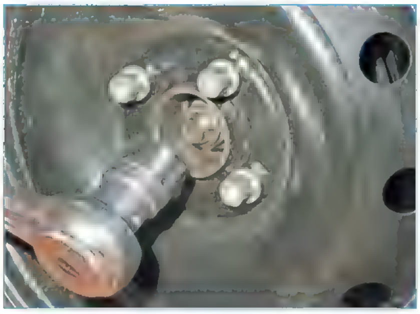
Brake pads of the rear wheel braking mechanisms must be replaced only as a set — all four pads.

Replacing the pads on only one brake mechanism can cause the vehicle to pull to one side during braking.

We show pad replacement on the left rear wheel. Remove the wheel's decorative cap.

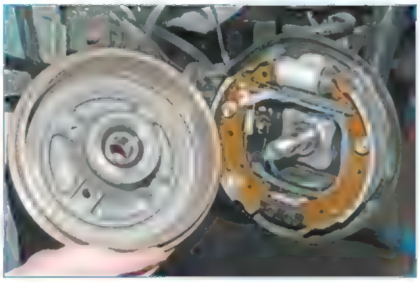


Pry off the hub bearing dust cap with a screwdriver.



Use a 30 mm socket to loosen the hub bearing nut.

Remove the rear wheel and securely support the vehicle on a factory-made jack stand. Before removing the brake drum, fully lower the parking brake lever — the vehicle must be released from the parking brake.

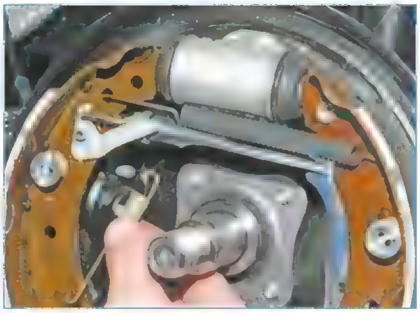


Remove the brake drum together with the bearing.

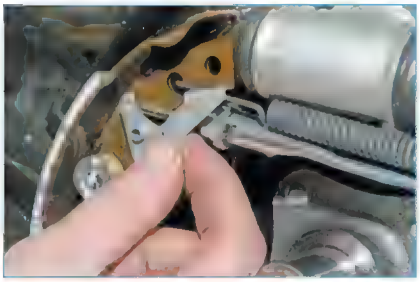
Do not press the brake pedal after removing the brake drum, as the pistons may fully protrude from the wheel cylinder.

Clean the lower parts of the brake shoe mechanism from dirt.

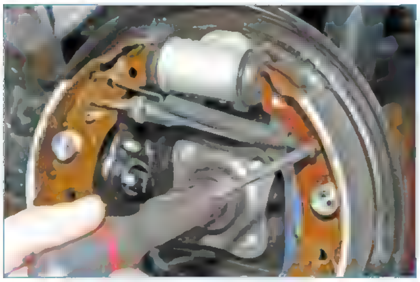
Use pliers to disconnect the lower end of the adjuster spring from the front shoe...



...and remove the spring.

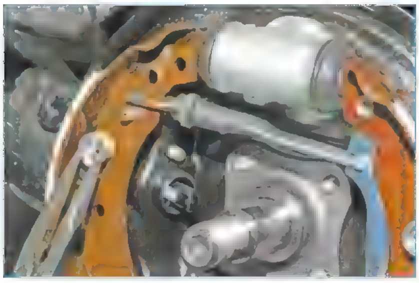


Remove the adjuster lever.

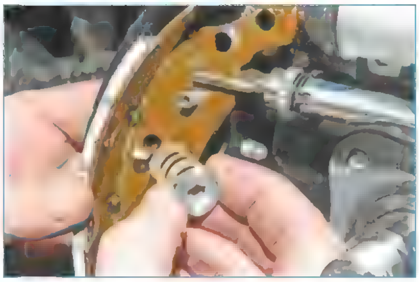


Prying with a screwdriver, disengage the upper return spring hook from the rear shoe...

...and remove the spring.

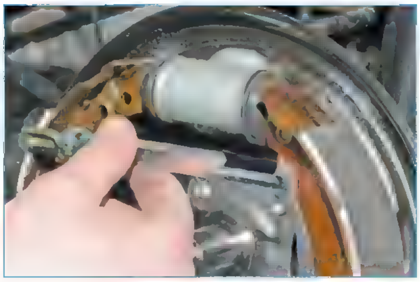


With pliers, rotate the spring cup of the shoe support pin until the slot in the cup aligns with the pin's tang.

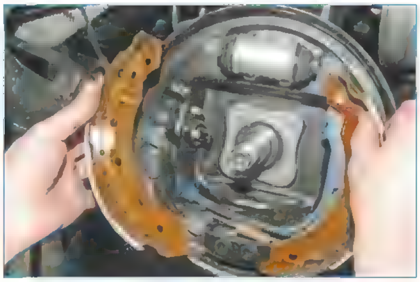


Remove the cup with the spring and withdraw the support pin from the brake backplate hole. Similarly, remove the support pin of the rear shoe.

Pull the upper end of the front brake shoe away from the wheel cylinder...

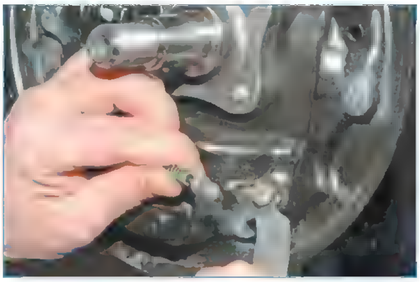


...and remove the spacer bar.



After detaching the lower return spring, remove the front brake shoe.

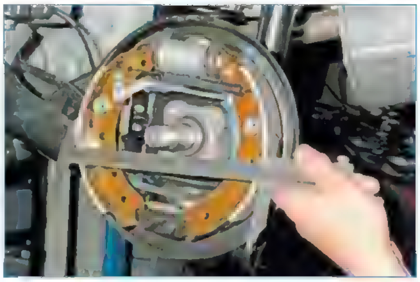
Remove the lower return spring.



Disconnect the parking brake cable end from the rear shoe lever and remove the shoe.

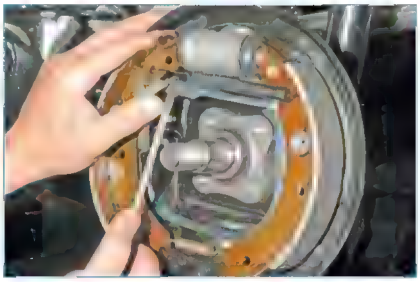
Check the condition of the parts and clean them.

Before installing the new pads, clean the threads of the spacer bar tip and the ratchet nut and apply a thin layer of grease to the threads. Install the new rear wheel brake pads in the reverse order of removal. After fitting the pads, return the automatic clearance adjustment mechanism to its original position. To do this, by changing the length of the spacer bar, set the distance between the outer surfaces of the front and rear pads to 202,45±0,25 mm.



Use a caliper to measure the distance between the outer surfaces of the front and rear shoe linings.

To change the length of the spacer bar...



...move the regulator lever away from the ratchet nut of the threaded end of the bar and turn the nut with a screwdriver

the nut (right-hand thread).

Before installing the brake drum, clean its working surface with a wire brush to remove dirt and pad wear debris. Replace the wheel hub bearing retaining nut with a new one and tighten it to the specified torque. Similarly replace the brake shoes on the right wheel (the thread on the end of the strut bar and the ratchet nut is left-hand).

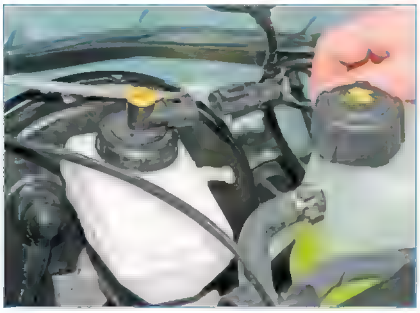
Then press the brake pedal several times to adjust the position of the brake shoes. You will hear clicks from the automatic clearance adjustment mechanism in the rear-wheel brakes as the shoes and brake drums engage. Continue pressing the pedal until the clicking stops. Adjust the parking brake

(see “Parking brake drive adjustment,” p. 236).
Check that the suspended wheels rotate freely with the parking brake lever fully released.

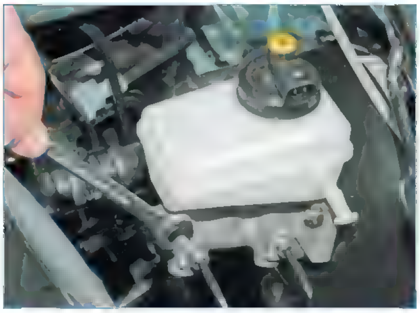
Check the brake fluid level in the hydraulic system reservoir and top it up if necessary.

Removing the master brake cylinder

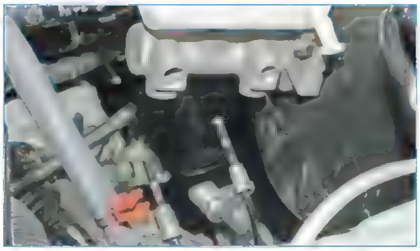
Perform this procedure when replacing the master brake cylinder and removing the brake vacuum booster. Work should be carried out in an inspection pit or on a ramp.



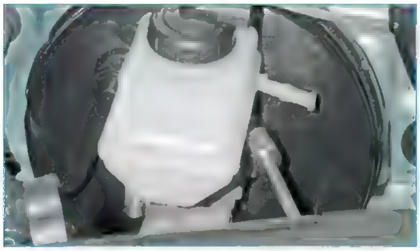
Lift the retainer and disconnect the wiring plug from the brake fluid level sensor.
Unscrew the reservoir cap and remove it together with the fluid level sensor. Use a rubber bulb to withdraw fluid from the reservoir and then screw the cap back on.



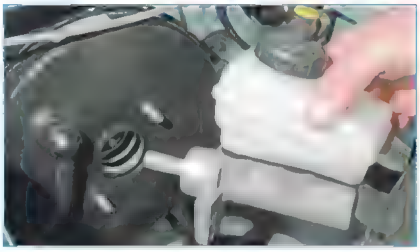
Using an 11 mm flare wrench or a special brake line fitting wrench, loosen the fittings on the two brake lines.



Remove the tube ends from the openings of the master brake cylinder.



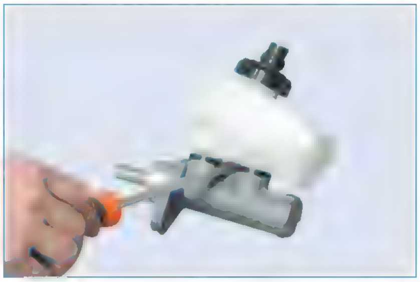
Use a 13 mm socket to loosen the two nuts securing the cylinder to the vacuum booster...



...and remove the master brake cycylinder assembled with the hydraulic actuator reservoir.

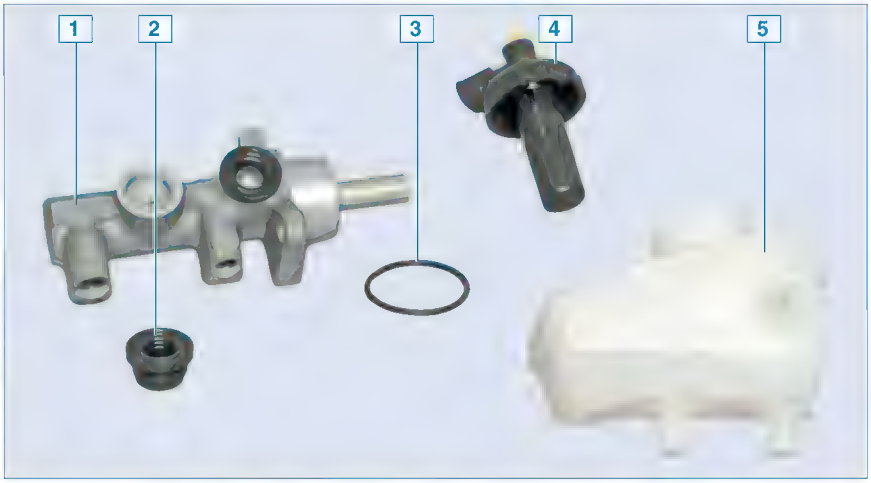
The connection between the master brake cylinder and the vacuum brake booster is sealed with a rubber ring located in the groove of the cylinder flange. Remove the ring from the flange groove.

If it is necessary to remove the power-steering reservoir...



...insert a screwdriver between the body of the reservoir and the cylinder. Overcoming the resistance of the sealing rubber sleeves...

...pull the reservoir fittings out of the openings of the cylinder...



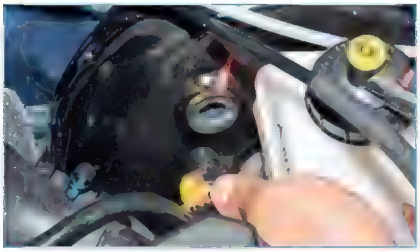
Components of the master brake cylinder and the brake system hydraulic reservoir: 1 – master brake cylinder; **2** – sealing sleeve; **3** – seal of the brake booster; **4** – reservoir cap with low-fluid-level sensor; **5** – hydraulic reservoir

...and remove the reservoir. Pull the sealing sleeves of the reservoir fittings out of the master brake cylinder openings. Inspect the condition of the rubber sealing sleeves and rings. If they are damaged (tears, cracks) or have lost elasticity, replace them with new ones. Reassemble the master brake cylinder with the reservoir and install it in the reverse order.

Bleed the brake hydraulic system (see “Bleeding the brake system hydraulic drive,” p. 48).

Removal of the vacuum brake booster check valve

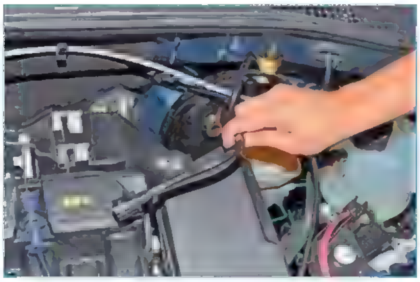
Perform this procedure to assess the valve's operability or when replacing it.



Overcoming the resistance of the retaining clips, remove the non-return valve from the sealing sleeve of the brake vacuum booster housing. To assess the condition of the check valve, its tube must be disconnected from the fitting of the 1.6 (16V) engine's receiver or from the intake manifold fitting of 1.4–1.6 (8V) engines. To do this...

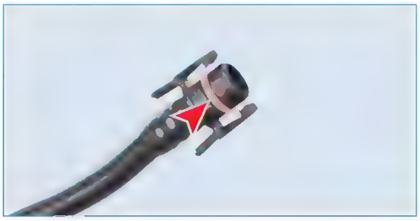
...squeeze the two retainers of the valve tube fitting...

...and disconnect the tube fitting from the receiver nipple (shown on the 1.6 (16V) engine)).



Remove the check valve together with the tube.

You can check the valve for proper operation by blowing through it (for example, with your mouth) in both directions. Air should pass from the booster toward the reservoir, and not in the opposite direction. Replace the valve if it is faulty. If the booster check valve is serviceable, reinstall it in the reverse order. Before installing the valve, check the condition of...



...rubber sealing ring of the valve tube fitting...

...and the rubber sealing sleeve of the valve located in the bore- the vacuum booster housing.

If the ring or sleeve show deformations, cracks, tears, or have lost their elasticity, replace the parts with new ones.

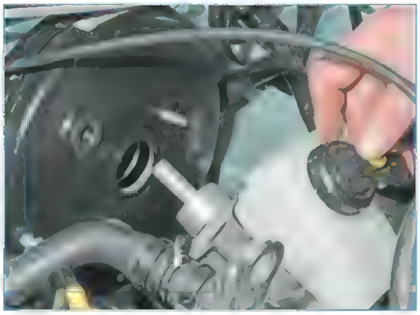
Removing the Brake Booster

Remove the vacuum brake booster to replace it if it fails. The vacuum booster can also be removed for easier access when replacing the clutch cable.

Remove the booster check valve (see "Removing the vacuum brake booster check valve").

Loosen the two nuts securing the master brake cylinder to the vacuum booster (see "Removing the master brake cylinder", p. 230).

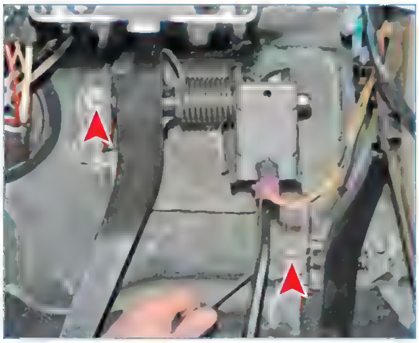
To prevent air from entering the brake hydraulic system, do not disconnect the brake lines from the master cylinder.



Carefully bending the brake lines, remove the master brake cylinder (with the reservoir) from the booster studs and move it aside.

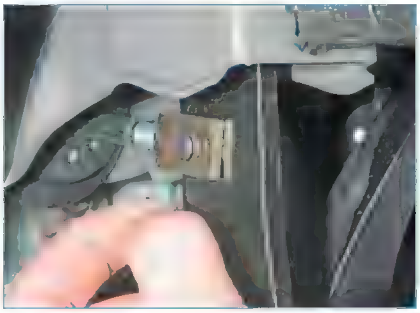
The connection of the master brake cylinder to the brake vacuum booster is sealed with a rubber ring (see “Removing the master brake cylinder,” p. 230).

Inside the passenger compartment under the instrument panel (the instrument panel has been removed for clarity)...

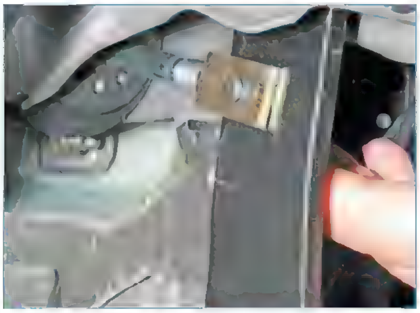


...pry up the two soundproofing retainers with a screwdriver...

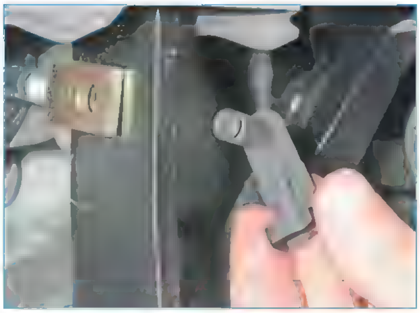
...and remove it.



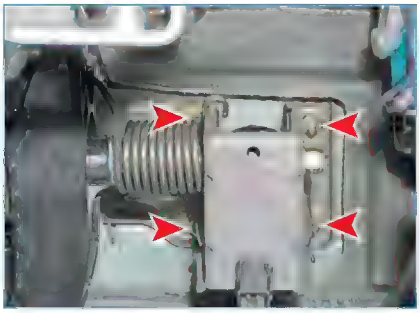
Remove the plastic retaining ring from the pin that secures the pushrod to the brake pedal.



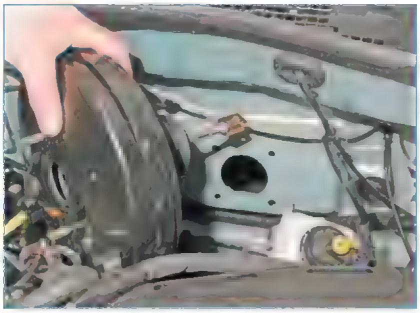
Pull the spring retainer on the pushrod mounting pin away from the brake pedal of the vacuum booster...



...and withdraw the pin from the holes in the pedal and the pushrod eye.



Using a 13 mm socket, unscrew the four nuts securing the vacuum booster to the front bulkhead.



Withdraw the booster pushrod from the hole in the front bulkhead...

...and remove the vacuum booster from the engine compartment.
Install the brake vacuum booster in the reverse order.

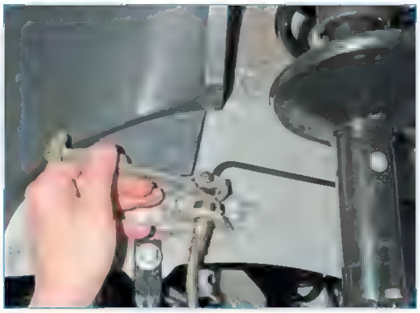
activity.

Replacement of the front brake system hose

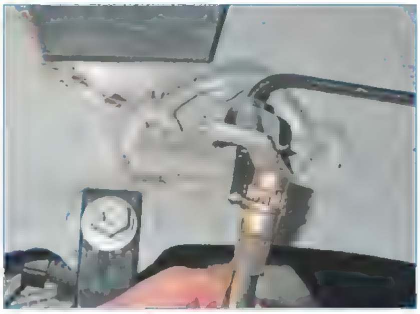
wheels

Replace the brake hose if it has mechanical defects — abrasions, cracks, or ruptures, or if a leak of brake fluid through the hose is detected. After driving more than 120,000 km or 5 years of vehicle use (whichever comes first), it is recommended to perform a mandatory replacement of the hoses on both front-wheel brake assemblies.

Work is performed over an inspection pit or on a ramp.
Remove the front wheel and securely support the vehicle on a factory-made stand.
Before unscrewing the brake line fitting from the upper hose end, use a wire brush to clean the connection area of dirt and corrosion, and apply a penetrating fluid such as WD-400.

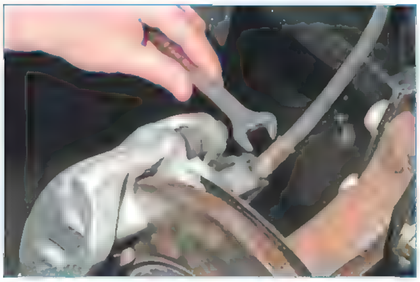


Use a special flare-nut wrench for brake line fittings to unthread the brake line fitting from the upper hose end.



Withdraw the hose end from the body bracket opening.

To prevent brake fluid leaks, place a rubber cap over the tip of the tube on the brake-bleeder fitting.



Using a 14 mm wrench, unscrew the lower hose fitting from the opening in the cylinder housing of the front wheel brake assembly...

...and remove the hose.

Sealing of the hose fitting to the cylinder housing is achieved by a cone, without sealing rings.

Install the front wheel brake hose in the reverse order.

When installing the hose, ensure it does not twist. For routing verification, a yellow longitudinal stripe is applied to the hose. The month and year of manufacture are also marked on the hose in yellow paint.

Bleed the brake hydraulic system (see "Bleeding the brake hydraulic system", p. 48).

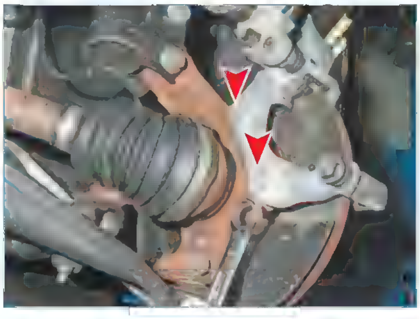
Front wheel brake disc replacement

Replace the brake disc when the friction surfaces are worn to their limit.

If the brake disc has cracks, deep scores, waviness, or other damage, it must also be replaced.

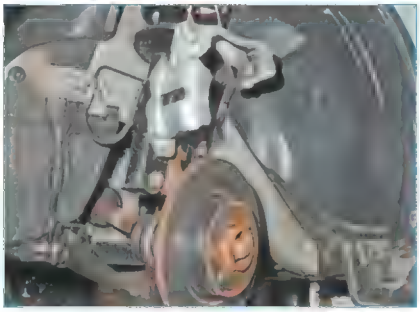
Replace the front wheel brake discs as a pair, and also replace the brake pads.

Remove the front wheel and securely support the vehicle on a manufacturer-approved stand. Turn the steering wheel fully toward the side where the disc will be removed. Remove the brake pads (see "Replacing front wheel brake pads", p. 226).



Use an 18 mm box wrench to loosen the two bolts securing the pad guide to the steering knuckle.

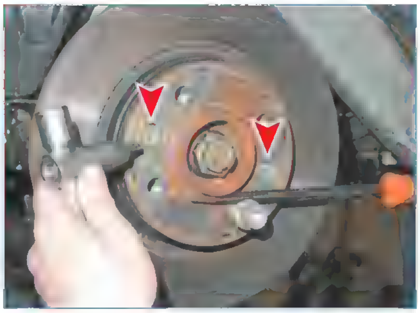
Remove the brake pad guide assembly with the spring clip from the brake disc...



...and tie them with wire or cord to the front suspension spring to avoid putting tension on the brake hose.

Using a wire brush, clean the heads of the bolts fastening the brake disc to the hub from dirt and corrosion.

Screw a wheel-retaining bolt into the hub's threaded hole and insert a tire lever between the bolt and the hub flange to prevent it from turning.

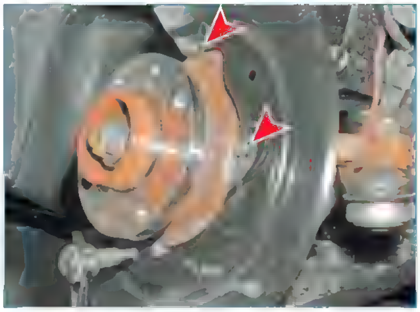


Using a Torx T-40 wrench, loosen the two screws securing the brake disc to the front wheel hub...

...and remove the disc from the hub.

If the brake disc shield is severely damaged — torn metal, heavy deformation — it must be replaced (minor shield defects can be straightened with pliers).

Before removing the shield, use a metal brush to clean the heads of the three screws securing the shield to the steering knuckle from dirt and corrosion.



Using a Torx T-30 wrench, unscrew the three screws securing the shield to the steering knuckle...

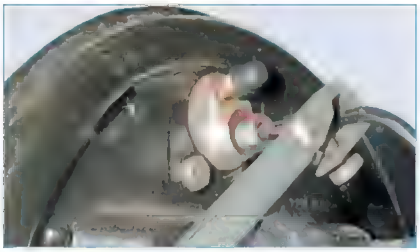
...and remove the shield of the front wheel brake mechanism. Install the shield and the front wheel brake disc in reverse order.

Replacement of the rear wheel brake cylinder

Replace the wheel (working) cylinder of the rear wheel brake mechanism if the wheel's braking efficiency decreases due to pistons sticking in the cylinder or brake fluid leaking through the cylinder's sealing rings.

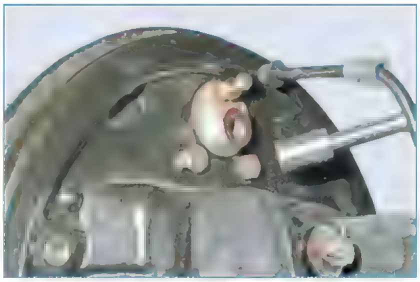
Remove the rear wheel and securely support the vehicle on a factory-made stand.

Perform the work over an inspection pit or on a ramp. Remove the brake mechanism drum (see “Replacing the rear wheel brake mechanism shoes,” p. 228). Before unscrewing the brake tube fitting from the cylinder port, clean the connection area of dirt and corrosion with a wire brush and apply a penetrating fluid such as WD-400.

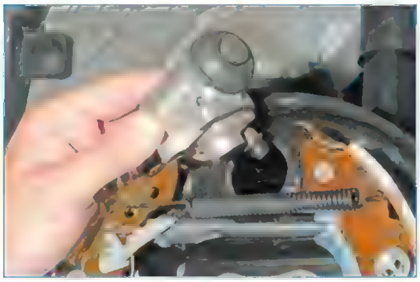


Using a special 11-mm wrench for brake line fittings, loosen the brake line fitting...

...and pull the tube tip out of the cylinder hole. To prevent brake fluid leaks, fit a rubber cap over the tube end of the brake mechanism bleed nipple.



Use a 10-mm socket to loosen the two bolt securing the cylinder to the brake mechanism backing plate...



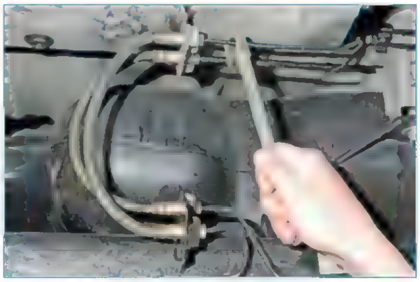
...and remove the cylinder.

Install the new cylinder in the reverse order. After installing the brake drum, bleed the brake hydraulic system.

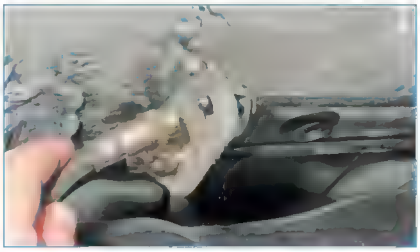
Rear wheel brake hose replacement

Replace the brake hose if there are mechanical defects—abrasions, cracks, or ruptures—or if brake fluid is found leaking through the hose, or if the rubber bulges when the brake pedal is pressed. After driving more than 120,000 km or five years of vehicle use (whichever comes first), it is advisable to perform a forced perform replacement of the hoses on both rear wheel brake assemblies.

Work is carried out on an inspection pit or a ramp. Before unscrewing the brake line fittings from the hose terminals, clean the connection areas of dirt and corrosion with a wire brush and apply a penetrating fluid such as WD-400.



Using a special "11" key for brake line fittings, unscrew the brake line fitting from the upper hose end.



Remove the upper hose end from the bracket hole in the body. To prevent brake fluid leaks, you can put a rubber cap over the bleed nipple of the brake fitting. Similarly, unscrew the brake line fitting located on the rear suspension beam from the lower hose end.

Remove the rear wheel brake hose.

Similarly, remove the brake hose of the other wheel’s brake assembly. The hoses have different lengths; the longer hose is located closer to the rear of the vehicle. The hoses run parallel to each other.

Install the rear wheel brake hoses in the reverse order. When installing the hoses, ensure they are not twisted; a yellow longitudinal stripe is marked on the hoses to help with this. Bleed the brake hydraulic system (see “ Bleeding the brake hydraulic system,” p. 48).

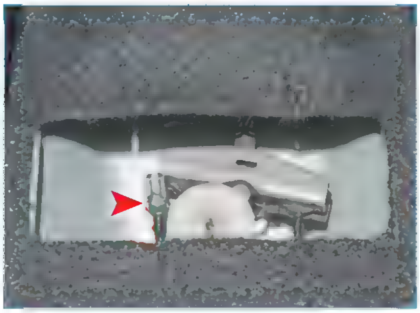
Parking brake cable replacement

Replace the parking brake cables if they break, stretch, or seize inside their housings (rear cables), or when adjusting the parking brake fails to hold the vehicle stationary on a slope of up to and including 23%.

Work is performed on an inspection pit or ramp.
The procedure for replacing the rear cable is shown using the left cable as an example; the right one is replaced in the same way.

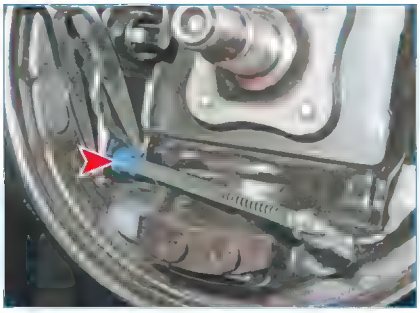
Remove the floor tunnel trim (see “ Removing the floor tunnel trim,” p. 303). To relieve tension on the cables, lift the parking brake lever and, using a 10 mm wrench, almost completely unscrew the adjustment nut on the threaded end of the front cable (see “ Adjusting the parking brake actuator,” p. 236). Lower the parking brake lever. Remove the rear wheel brake shoes (see “ Replacing the rear wheel brake shoes,” p. 228).

Using pliers, pull the front cable end into the passenger compartment of the vehicle and, while turning the equalizer...

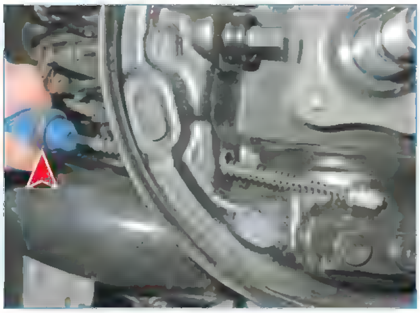


...we pull the cable out of the equalizer slot—

izer.



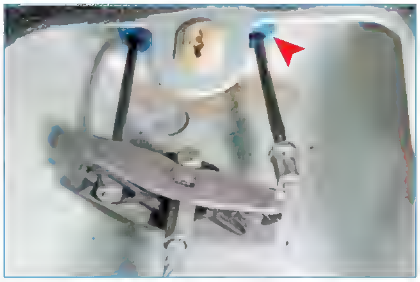
Squeezing the petals of the rear end cap retainer of the cable sheath with pliers...



...we pull the end out of the hole in the brake mechanism shield...
...and out of the metal holder on the rear suspension arm.

Remove the cable from the two plastic holders on the fuel tank...

...and the plastic holder on the vehicle floor.
Inside the car ...



...with pliers we squeeze the tangs retainer of the front end of the cable sheath and push the end out through the hole in the floor.
This operation is not easy to perform, since you have to work in the tight space of the floor well. But since we are removing the cable to replace it, you can simply break the plastic tabs of the retainer.

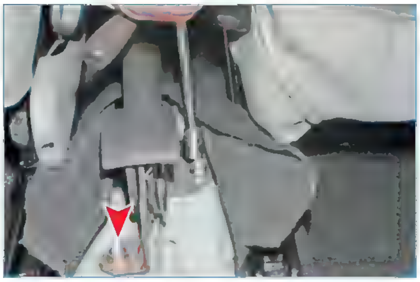
Route the cable out through the hole in the vehicle floor pan.
Remove the right parking brake cable in the same way.
Install the rear parking brake cables in the reverse order.

To replace the front parking brake cable, remove the floor tunnel trim (see “Removing the floor tunnel trim,” p. 303) and loosen the cable tension by turning the adjustment nut on the threaded end of the front cable drive.

Disconnect the front ends of the rear cables from the equalizer (see above).

Carefully cut the carpet floor covering behind the parking brake lever with a knife.

Bending back the cut parts of the carpet...



...use a 13 mm socket to loosen the two nuts securing the lever to the floor.

With the parking brake lever raised, disconnect the wiring plug from the parking brake warning switch.

Pulling the lever trim plug aside, use a 10 mm wrench to fully unscrew the adjusting nut on the threaded end of the front cable.

Pull the front cable out of the lever opening.

Using a screwdriver, pry off the plastic retainers from the equalizer one by one...

...the end of the front cable...

...and the ends of the rear cables.

Remove the front cable from the equalizer.

Install the front parking brake cable in the reverse order.

After replacing the cables or the lever, it is necessary to adjust the parking brake mechanism (see " Adjusting the parking brake mechanism").

Drive adjustment of the parking brake

Adjust the parking brake mechanism after replacing the rear wheel brake shoes, the cables, or the parking brake lever.

Raise the rear wheels and securely support the car on stands.

To avoid the vehicle falling, use only factory-made jack stands.

Remove the floor tunnel trim panel (see "Removing the floor tunnel trim," p. 303). The procedure is illustrated with the seats removed for clarity. With the parking brake lever raised...

...we pull back the trim plug of the lever that covers the adjustment nut of the parking brake actuator.

Using a 10 mm wrench, turn the nut on the threaded end of the front cable while adjusting the movement of the parking brake lever.

The travel of the parking brake lever should be 6–8 clicks (teeth on the pawl sector).

With the lever fully lowered, the rear wheels that are off the ground...

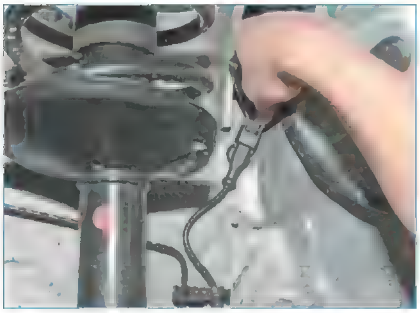
...should rotate freely, and when the lever is raised they should be locked.

According to traffic regulations, a properly adjusted parking brake must hold the vehicle on a slope up to and including 23%.

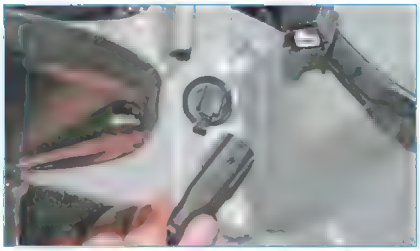
Removing the front wheel speed sensor

We remove the front wheel speed sensor for inspection or replacement when ABS malfunctions are detected, and also when removing the steering knuckle.

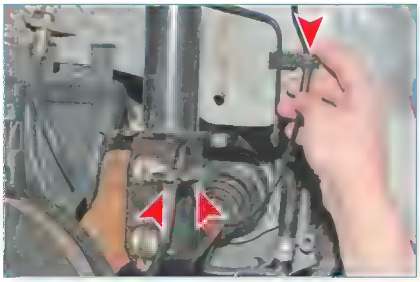
Remove the front wheel inner fender (see “Removing front wheel splash guards and inner fenders,” p. 284). Securely support the vehicle on a manufacturer-approved stand.



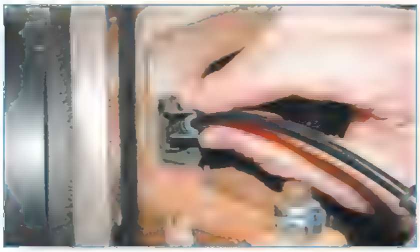
Press the latch and disconnect the connector of the front wiring harness from the connector of the sensor harness.



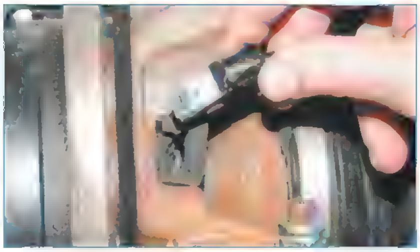
Remove the sensor harness connector from the holder mounted on the wheel arch.



Pull the rubber boot of the sensor wiring harness out of the plastic retainer located on the splash guard, and remove the other two boots from the bracket on the strut.



Squeezing the locking tabs...

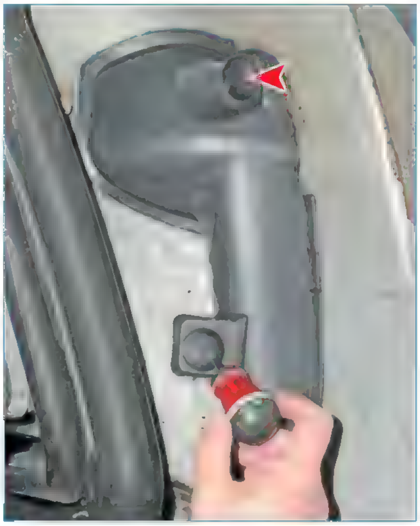


...we remove the wheel speed sensor from the mounting ring located in the hub assembly. Before installation, clean the sensor mounting area as well as the sensor itself if it is not being replaced.
Install the front wheel speed sensor in the reverse order.

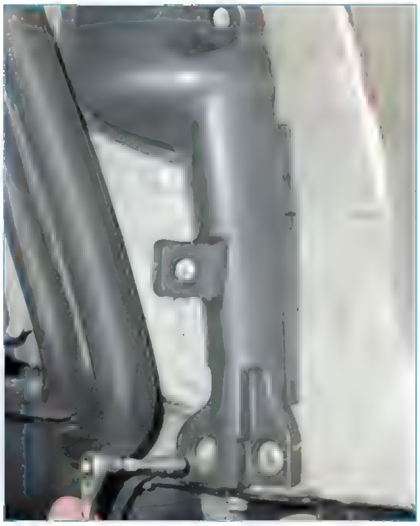
Removing the rear wheel speed sensor

Remove the rear wheel speed sensor for inspection or replacement when ABS malfunctions are detected, as well as when removing the rear suspension beam.

Lift and remove the wheel
Securely support the vehicle on a manufacturer-approved stand.



Using a slotted screwdriver, unscrew the two retaining clips that secure the protective cover of the sensor wiring harness.



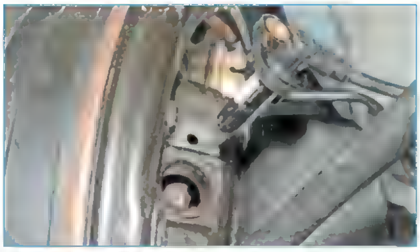
Using a 10 mm socket, loosen the two nuts holding the protective cover in place.

Pull the cover away from the arch and remove the wiring harnesses from the cover retainers.

Disconnect the connector of the rear wiring harness from the connector of the sensor harness.

Pull the rubber grommet of the sensor wiring harness out of the holder on the rear suspension arm.

Use a Torx T-30 wrench to loosen the sensor mounting screw...



...and remove the sensor from the brake backing plate hole.
Before installation, clean the sensor mounting area and the sensor itself.

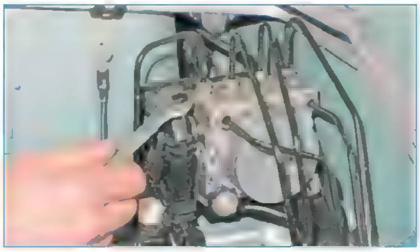
seal, if it is not to be replaced.
Install the rear wheel speed sensor in reverse order.

Removing the ABS unit

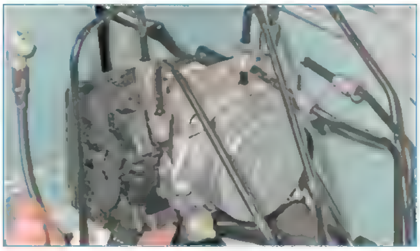
Remove the ABS unit to replace it if it fails.

Perform the work on an inspection pit or a ramp.

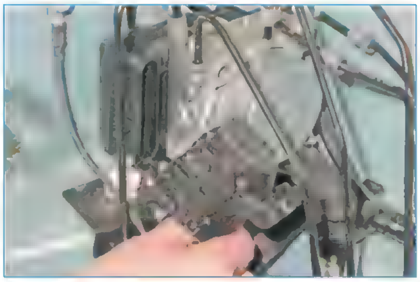
Before removing the unit, mark the positions of the brake lines on it. In the engine compartment on the right side...



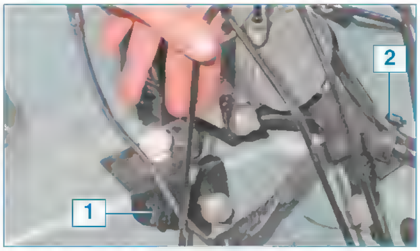
Using an open-end wrench size 11 or a special wrench for brake line fittings, loosen the fittings of the six brake lines бок **and disconnect the hoses from the hydraulic unit.**



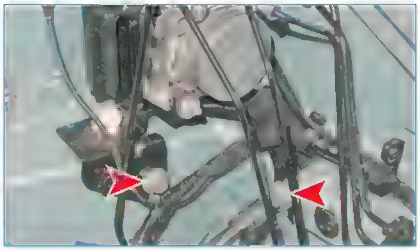
Lift the wiring harness connector latch...



...disconnect the connector from the control unit.



Remove the brake line from holder 1 and the wiring harness from holder 2 of the ABS bracket.



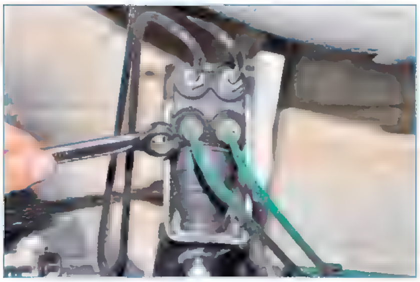
Using a 13 mm socket, loosen the two bolts securing the ABS unit bracket to the body...
...and remove the ABS unit with the bracket.
The ABS unit is attached to the bracket with two rubber bushings. If the bushings have cracked or the rubber has deteriorated elasticity, the bushings need to be replaced.
Loosening the two nuts that secure the ABS unit to the bracket with a 10 mm wrench...

...we separate the unit from the bracket.

Reinstall the ABS unit in reverse order.
Bleed the brake hydraulic system (see “Bleeding the brake hydraulic system,” p. 48).

Removal of the rear-wheel brake pressure regulator, adjustment of the linkage

Remove the pressure regulator for replacement if it fails (detectable by leaks or a seized piston). Perform the work on an inspection pit or ramp.
Clean the connection points of the brake lines to the regulator of dirt and corrosion with a wire brush and apply a penetrating fluid such as WD-400.Before disconnecting the brake lines from the pressure regulator, mark them.

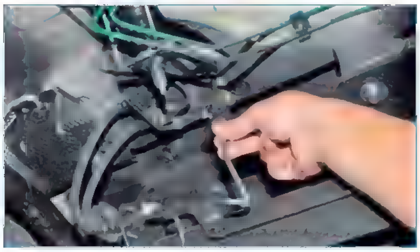


Using the special "11" wrench for brake line fittings, loosen the fittings of the four brake lines connected to the regulator...

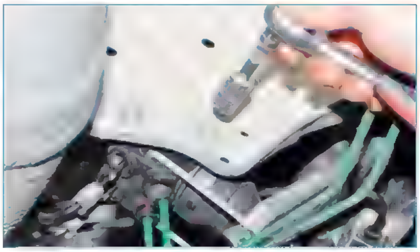
...remove the tube fittings from the regulator openings and so that To prevent brake fluid from leaking out of them, slip rubber caps over the lines.

To avoid mixing the tubes during assembly, their fittings have different threads. The fittings for the right brake mechanism are threaded M12x1, and the left are M10x1.

Disconnect the lower end of the regulator rod from the rear suspension beam bracket...



...and remove the rod by drawing the adjusting sleeve out of the pressure lever hole.

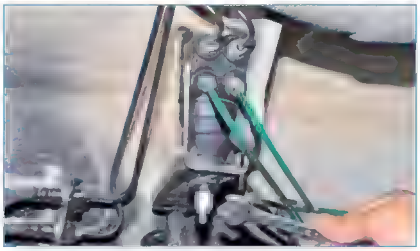


Turning the head with a "11" wrench, loosen the two bolts securing the pressure regulator to the body...

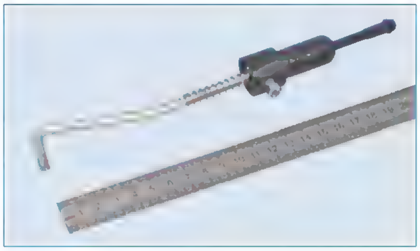
...remove the regulator.

Install the pressure regulator in reverse order and bleed the brake hydraulic system (see "Bleeding the brake hydraulic system," p. 48). After bleeding the system, it is necessary to adjust the pressure regulator actuator.

This operation can be performed correctly only using special equipment at a specialized service center.
Before the brake pressure regulator is diagnosed at a specialized auto service, you can perform a rough adjustment of the regulator drive yourself in several stages. Before adjusting, on a safe spot and on level asphalt, conduct a kind of road test in which an observer outside the vehicle should note the moments when the front and rear wheels lock during hard braking from 30–40 km/h. The rear wheels should lock slightly later than the front ones.



Make the adjustment by turning the regulator stud's adjustment nut.
If the adjustment range is insufficient...



...then change the length of the linkage by moving the adjustment sleeve along it. Repeat the road test and, if necessary, repeat the adjustment.

Electrical equipment

Description of the design

The onboard DC electrical system has a nominal voltage of 12 V. The electrical equipment is built using a single-wire system: the negative terminals of power sources and consumers are connected to the " ground" — the vehicle body and power unit, which serve as the second conductor.

При nonrunning engine powered consumers are powered by the battery battery, and after the engine starts — by the generator.

When the generator is running, the battery is charged.

A lead starter battery with reverse polarity is installed on the vehicle (the negative terminal faces the left side of the vehicle, and both terminals are located closer to the windshield). The nominal capacity in the 20-hour discharge mode is 70 Ah. A ccumulator бtery is non- б serviceable; it has no filler caps for checking electrolyte specific gravity or adding distilled water.

The battery's charge level can be determined by the color of the indicator built into the battery cover:

Rechargeable battery

– green indicator color indicates indicates that the battery is charged;

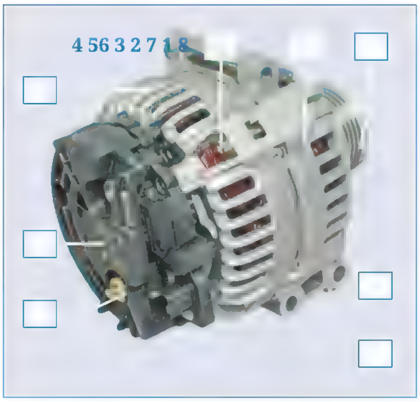
– dark color of the indicator – the battery is partially discharged;

– transparent or light yellow the indicator color indicates that the electrolyte level has fallen below the permissible limit.

При when working with the battery strictly observe the rules for handling the battery these are the safety rules (see "Safety when servicing and repairing").

Depending on the trim, the vehicle is fitted with alternators manufactured by MELKO, VALEO, or BOSCH (maximum output current from 70 to 150 A).

The generator is driven by a multi-ribbed belt from the auxiliary drive pulley. On vehicles without power steering and air conditioning, the generator is mounted on the rear of the engine (in the direction of travel); on other vehicles, it is mounted at the front.



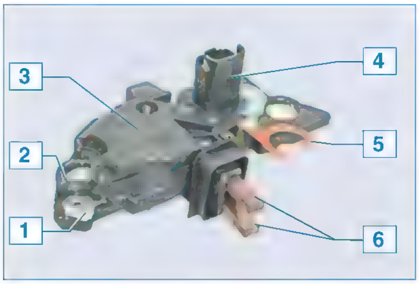
Generator: 1 – terminal “V2+”; **2** – housing;**3** – rear cover; **4** – clamp bolt;**5** – front cover; **6** – generator pulley; **7** – brush holder with voltage regulator; **8** – brush holder connector

All generators are three-phase alternating-current units with an integrated rectifier and voltage regulator.

The generator end covers and stator are secured with four bolts. The rear of the generator is covered by a plastic shroud. The rotor shaft runs on two ball bearings mounted in the generator covers. The bearings are sealed type; the grease packed in them is intended to last for the entire service life of the generator. The rear bearing is pressed onto the rotor shaft and is seated in a plastic sleeve in the rear cover. The front bearing is pressed into the front cover, and the fit of the bearing on the rotor shaft is a sliding fit.

The stator of the generator contains three-phase windings. The ends of the phase windings are connected to the terminals of the rectifier assembly, which consists of six diodes — three positive and three negative — pressed into two retaining plates according to polarity (positive and negative on separate plates). The rectifier assembly is mounted on the generator’s rear cover (under a plastic housing). The excitation winding is located on the rotor of the generator; its leads are soldered to two copper slip rings on the rotor shaft. Power is supplied to the excitation winding through two brushes located in a brush holder, which is structurally integrated with the voltage regulator and attached to the generator’s rear cover.

The voltage regulator is a non-disassemblable unit; if it fails, it is replaced assembled with the brush holder.

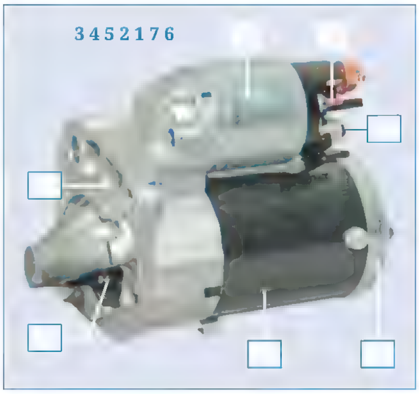


Brush holder with voltage regulator: 1 – ground terminal; **2** – brush holder housing; **3** – voltage regulator; **4** – electrical connector;**5** – "+ " terminal; **6** – brushes

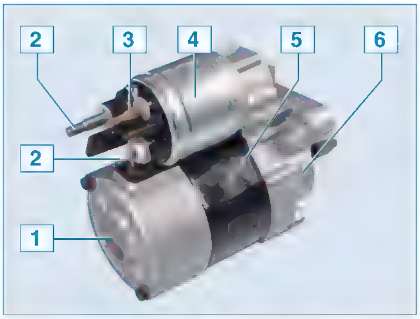
For starting the engine, vehicles with 1.4 and 1.6 (8V) engines use a MITSUBISHI starter model M000T45171ZT, while the vehicle with a 1.6 (16V) engine uses a VALEO model TS10E3. The starter is located on the rear side of the engine and is attached to the clutch housing with three bolts.

The starter is a direct-current electric motor with a freewheeling clutch and a two-winding solenoid relay. The MITSUBISHI starter is excited by permanent magnets, while the VALEO starter is excited by electromagnets.

The armature shaft rotates in two bushings pressed into the starter's front and rear covers. The housing and covers are clamped together with two bolts.



Starter MITSUBISHI: 1 – gear atwater; **2** – front cover; **3** – pull-in relay; **4** – control terminal of the pull-in relay; **5** – contact bolts; **6** – rear cover; **7** – starter housing



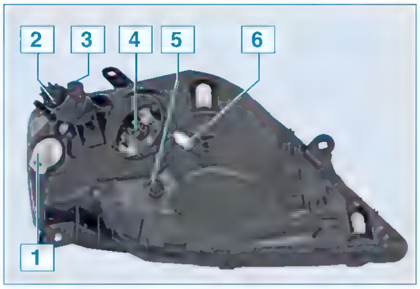
VALEO starter: 1 – rear cover; **2** – terminal bolts; **3** – control terminal of the pull-in relay; **4** – pull-in relay; **5** – starter housing; **6** – front cover

A one-way clutch with a drive gear is mounted on the armature shaft and can slide on the shaft splines. It transmits torque in only one direction — from the starter to the engine — disconnecting them after the engine starts. This is necessary to protect the starter from damage due to excessive rotational speed.

The solenoid relay serves to engage the drive pinion with the engine flywheel's ring gear and to switch power to the starter motor.

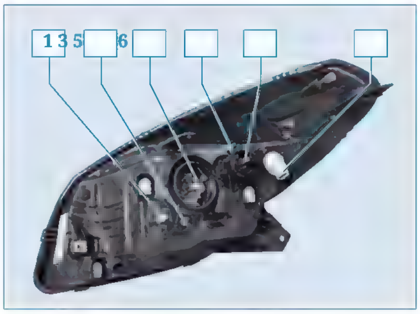
When the ignition key is turned to the “starter” position, voltage is supplied to both windings (the pull-in and holding windings) of the starter solenoid. The solenoid armature is pulled in and, with a plastic lever, moves the overrunning clutch and the drive pinion along the armature shaft splines, engaging the pinion with the flywheel ring gear. At the same time the starter motor engages and the pull-in winding of the solenoid is momentarily de-energized. After the key is returned to the “ignition” position, the holding winding is de-energized and the drive pinion disengages from the flywheel under spring action. A faulty solenoid is replaced. Drive faults in the starter are detected during inspection after disassembling the starter.

The lighting and signaling system includes: two headlamps, fog lamps (optional), side turn indicators, taillights, license plate illumination lamp, additional brake light, interior dome light, trunk light, glove compartment light (optional), and one or two horns (depending on the trim).



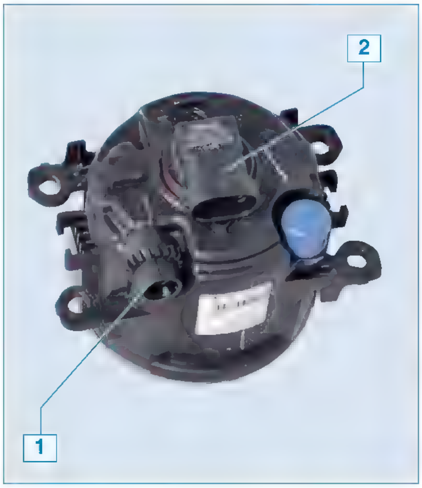
Headlight assembly of Logan car: 1 – bulb holder for the turn signal; **2** – actuator for adjusting the headlight beam direction; **3** – screw for adjusting the headlight beam in the vertical plane; **4** – headlight bulb; **5** – parking light bulb socket; **6** – knob for adjusting the headlight beam in the horizontal plane

The headlight unit combines two sections. One contains an H4 dual-filament headlamp bulb for low and high beams and a W5W parking/position light bulb. In the other



Headlight unit of Sandero and Sandero Stepway: 1 – horizontal beam adjustment knob; **2** – parking light bulb socket; **3** – headlight bulb; **4** – vertical beam adjustment screw;

vertical plane; **5** – actuator of the headlight beam direction regulator; **6** – turn signal bulb holder

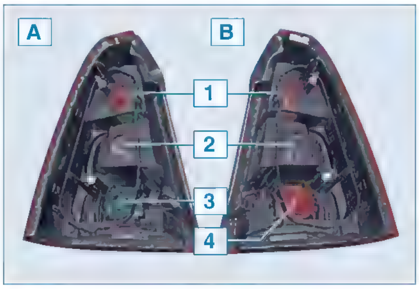


Fog lamp: 1 – adjustment screw; **2** – lamp bulb

The section is fitted with a PY21 W (orange) turn signal lamp.

Some vehicles are equipped with fog lamps mounted in the front bumper. The fog lamps use H11 halogen single-filament bulbs.

The taillight includes lamp sections for the brake and parking lights (a dual-filament P21/5W bulb), the turn signal (a PY21W bulb), and also the rear fog light — in the left lamp — or the reversing light — in the right one (a P21W bulb). The Logan uses an interesting solution. To make the right and left lamps look identical from the outside, their lower outer lenses are pink. To produce white light when the reversing lamp is on, an additional green filter is installed in the reversing section, and a red filter is installed in the rear fog light section.



Lamp positions in the rear lights: A – right light; **B** – left light;**1** – brake and parking light; **2** – turn signal; **3** – reverse light; **4** – fog light

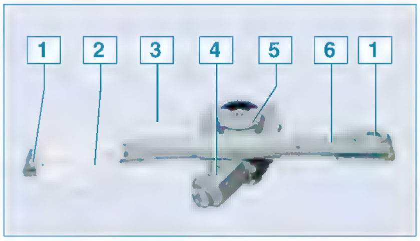
Fuse and relay block

Inside the cabin, to the left under the instrument panel, there is a junction block. This unit is the electronic control module for the central locking, the interior dome light, the turn signals, the hazard warning lights, the intermittent windshield wiper function, the rear window defogger relay, and the engine immobilizer system. In addition, the junction block emits an audible warning (buzzer) to remind you of exterior lights left on when a door is open and activates the indicator in the instrument cluster.

Some vehicles, depending on the trim level, are equipped with power windows on either the front doors or all doors.

The window regulator motor-reducer consists of a worm gear reducer and a DC electric motor. The motor is reversible. A drum with a cable is mounted on the reducer's output shaft. A slider is attached to the cable, and the window glass is fastened to that slider with two self-tapping screws.

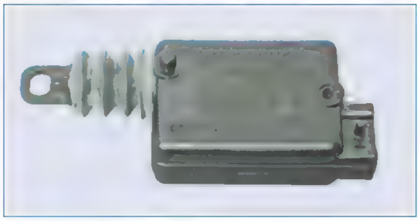
Some vehicles are equipped with a door lock blocking system (central locking). The system is designed to lock all the... doors and the trunk lid (the luggage compartment door on Sandero and Sandero Stepway vehicles) simultaneously when the switch button located on the instrument panel console or the remote control on the ignition key is pressed.



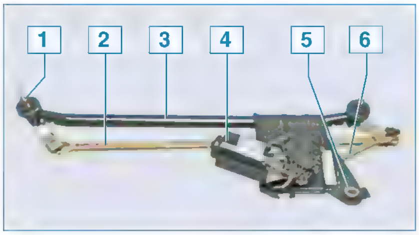
Power window regulator: 1 – guide roller; **2** – slider; **3** – cable;**4** – gear motor; **5** – drum; **6** – guide

Electric actuators are installed on the locks of all doors and the trunk lid; they connect to the lock release levers.
Some vehicles are equipped with exterior rearview mirrors that have electric adjustment and heating. Both mirrors are controlled by the exterior mirror adjustment switch located in the floor tunnel trim. Voltage from the switch is supplied to two electric motors housed in the mirror assembly. One motor adjusts the mirror in the vertical plane and the other in the horizontal plane. Voltage to the mirror heating element is supplied from the rear window defogger switch.

The windshield wiper is installed on the left under the front panel cover. The wiper consists of



Door lock actuator



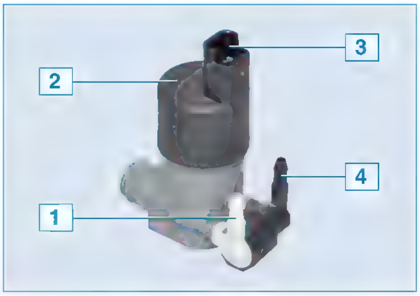
Windshield wiper assembly: 1 – drive with the wiper arm pivot; **2** – long link; **3** – bracket; **4** – gear motor; **5** – wiper mounting cushion;**6** – short link

from a gear motor with rods attached to a bracket, levers and brushes. The cleaner's electric motor is three-brush, two-speed, with excitation from permanent magnets. The cleaner has three operating modes, which are selected by the right-hand steering-column switch. The intermittent operation mode of the cleaner is provided by the commutation block. If the gear motor fails, it is replaced.

The luggage-compartment door glass wiper is mounted on the luggage-compartment door, under the trim. The wiper consists of a gear motor, a lever and a blade. The wiper motor is two-brush, with excitation from permanent magnets.

The windshield washer consists of a translucent plastic reservoir, an electric pump, flexible hoses and two nozzles. The washer is activated by the right-hand steering-column switch. The washer reservoir is installed on the right under the instrument-panel trim. The pump is inserted into the washer reservoir through a rubber seal. A faulty pump is replaced. The nozzles are mounted on the hood. Clogged nozzles can be blown out in the reverse direction or cleaned with line.

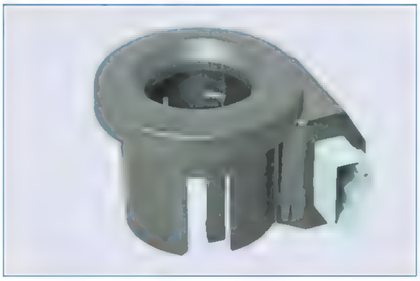
On the Sandero and Sandero Stepway models, the windshield washer is combined with the washer for the tailgate window. The pump motor is reversible—when the motor shaft rotates in one direction, fluid is supplied to the windshield; when it rotates in the other direction, it is supplied to the tailgate window.



Washer pump for Sandero and Sandero Stepway: 1 – nozzle supplying fluid to the tailgate window; **2** – electric motor;**3** – electrical connector; **4** – nozzle supplying fluid to the windshield

All vehicles are equipped with an anti-theft engine start lock system — an immobilizer. The immobilizer consists of: a switching unit; a communication coil mounted on the ignition switch; a microchip in the ignition key (transponder); and a status indicator in the instrument cluster.

When the key is inserted into the ignition switch, the coil reads the code from the key's chip and transmits it to the ignition control unit. The control unit compares the key code with the code stored in the unit's memory. If the codes match, the unit sends a signal to the engine control unit (ECU) authorizing engine start — at which point the indicator in the instrument cluster goes out.

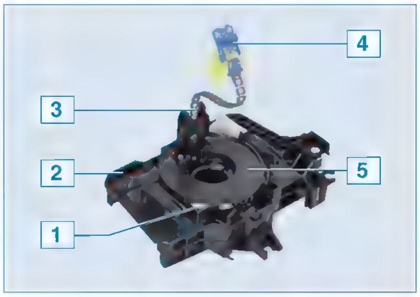


Immobilizer coil

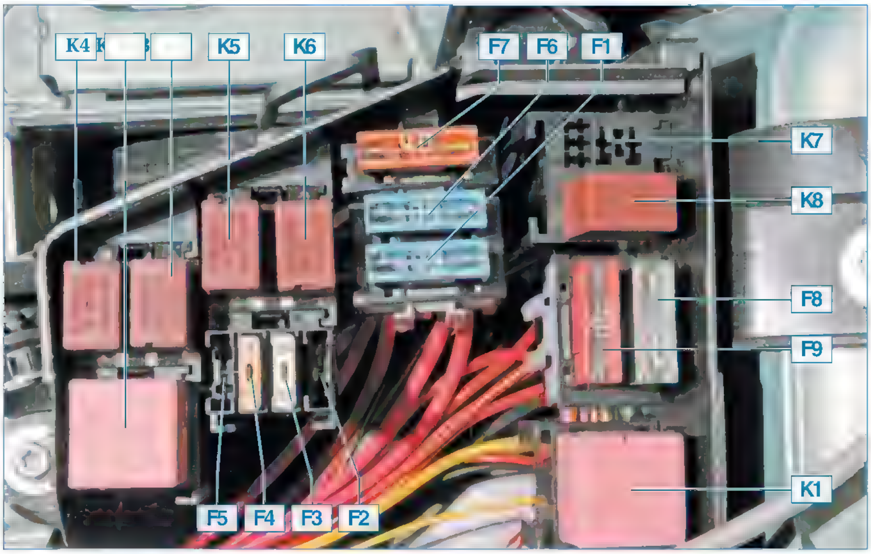
If the codes do not match, the ECU, on the signal from the control unit, blocks the engine start, and the indicator in the instrument cluster will flash continuously and rapidly. The engine start immobilizer activates automatically a few seconds after the key is removed from the ignition switch.

Depending on the trim, vehicles may be equipped with either a driver's airbag or both driver and front passenger airbags. The driver's airbag is mounted in the steering wheel, and the passenger airbag is located in the instrument panel above the glove compartment.

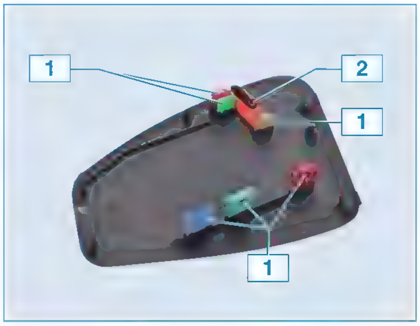
To electrically connect the driver's airbag to the vehicle's electrical system, an ordinary sliding contact must not be used to avoid sparking and unintended airbag deployment. For this reason, the vehicle uses a device with a so-called spiral cable that operates on a reel principle. Several turns of a metal-plastic tape are wound spirally inside the cylindrical plastic housing of the device, which is incorporated into the housing of the steering column switch connector,



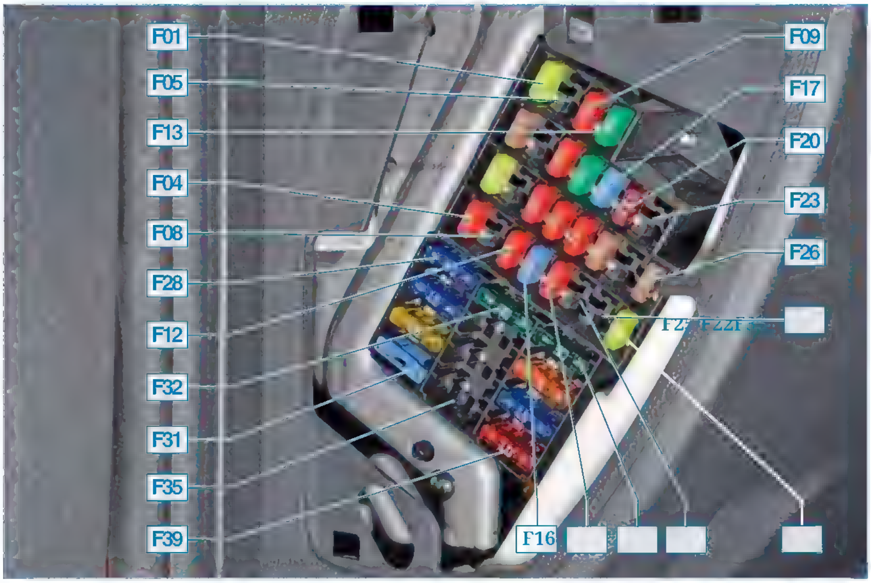
Clock spring assembly: 1 – spiral cable;**2** – steering-column switch connector; **3** – clock spring lead; **4** – connector to the airbag; **5** – drum



Fuse and relay mounting block in the engine compartment: F1–F9 – fuses; K1–K8 – relays (see Tables 1 and 2 for fuse and relay functions)



On the inner side of the mounting block cover are spare fuses 1 (rated 5, 10, 15, and 30 A), a removal tweezer 2 for extracting fuses from the block, and a diagram showing the fuse locations



Fuse mounting block in the passenger compartment (see Table 3 for fuse functions)

is an electrical conductor. One end of the cable ribbon, through a connector located on the steering-column switch housing, is mated to the wiring harness plug of the vehicle's electrical equipment. The other end of the cable is led out to the protruding lug of the drum device and connected through a pad with a safety cushion. The drum leash of the device fits into the hub opening of the steering wheel. When the wheel turns, it rotates the drum via the leash, and with it the cable tape, which is located in a cylindrical housing either at the larger or the smaller radius. From its central position the drum with the leash in the device can rotate in either direction to the stop for up to three full turns.

This prevents the cable from breaking when the steering wheel is turned from the neutral position by 2.25 turns in each direction on a vehicle without power steering, and by a slightly smaller number of turns on a vehicle equipped with hydraulic power steering.

Most electrical circuits are protected by fuses. High-power consumers (rear window defogger element, heater blower, engine cooling fan, air conditioner, and others) are connected through relays. All relays (except the rear window defogger relay), main fuses and the engine management system fuses are installed in the relay and fuse mounting block located in the engine compartment on the left, behind the battery. The remaining fuses are located in the fuse mounting block installed in the cabin on the left side of the instrument panel. The rear window defogger relay is mounted on the cross member beneath the instrument panel.

Table 1

FUSES IN THE ENGINE COMPARTMENT FUSE/RELAY BOX

Fuse designation (rated current, A)	Protected components
F1 (60)	Circuits: power supply for the ignition switch and all consumers powered from the switch; left steering-column switch
F2 (30)	Power circuit of relay K3 for the cooling fan (on vehicles without air conditioning)
F3 (25)	Power circuits: relay K5 for the fuel pump and the ignition coils; main relay K6 of the engine control system
F4 (5)	Circuits: constant power supply for the engine control unit (ECU); windings of the main relay K6 of the engine management system
F5 (15)	Not used
F6 (60)	Power supply circuit for the interior fuse box
F7 (40)	Power circuits: relay K4 for the air conditioner; relay K3 for low fan speed of the cooling system (on vehicles with air conditioning); relay K2 for high fan speed of the cooling system (on vehicles with air conditioning)
F8 (25) and F9 (50)	ABS ECU circuits

Table 2

RELAY OF THE ENGINE COMPARTMENT FUSE BOX

Designation	Name	Powered consumers
K1	Heater fan relay	Heater fan motor
K2	Cooling fan high-speed relay (for vehicles with air conditioning)	Cooling system fan motor
K3	Low-speed cooling fan relay (for vehicles with air conditioning) or cooling fan relay (for vehicles without air conditioning)	Cooling fan motor (for vehicles with air conditioning — via a resistor)
K4	Air conditioning relay	Compressor electromagnetic clutch air conditioning
K5	Fuel pump relay and ignition coils	Fuel pump and ignition coil
K6	Main relay of the engine management system	Oxygen concentration sensors (heater circuit); speed sensor; fuel injectors; canister purge solenoid valve; windings of relays K2, K3, K4; engine control unit (ECU)
K7 (option)	Headlamp washer pump relay	Headlamp washer pump
K8	Fog light relay	Fog light bulbs

Table 3

FUSES OF THE INTERIOR FUSE/RELAY BOX

Fuse designation (rated current, A)	Protected circuits
F01 (20)	Circuits: windshield wiper; rear window defogger relay coil; switching block; tailgate window wiper (Sandero)
F02 (5)	Circuits: instrument cluster power supply; relay K5 winding for the fuel pump and ignition coil; engine control unit power supply from the ignition switch
F03 (20)	Circuits: brake signal lamps; windshield washer
F04 (10)	Circuits: turn signal lamps; engine management diagnostic connector; immobilizer coil; junction block
F09 (10)	Circuits: left headlamp unit headlight bulbs (low beam); low beam indicator in the instrument cluster; headlight washer pump
F10 (10)	Right headlamp unit headlight bulb circuit (low beam)
F11 (10)	Circuits: left headlamp unit headlight bulbs (high beam); high beam indicator in the instrument cluster
F12 (10)	Right headlamp bulb circuit (high beam)
F13 (30) and F14 (30)	Rear and front door power window circuits, respectively

FUSES OF THE INTERIOR FUSE BOX

Fuse designation (rated current, A)	Protected components
F15 (10)	ABS ECU circuit
F16 (15)	Driver and front passenger seat heating circuits
F17 (15)	Sequence of audio signals
F18 (10)	Circuits: left headlamp parking light; left rear tail light parking light; license plate lamp
F19 (10)	Circuits: right headlamp position light bulbs; right rear position light bulbs; glove box lamp bulbs; illumination of the instrument cluster and controls on the dashboard, console, and floor tunnel trim; wiring block buzzer
F20 (7.5)	Circuits: rear fog lamp bulb and indicator lamp
F21 (5)	Circuit for the heating elements of the exterior rearview mirrors
F28 (15)	Circuits: interior dome light bulbs; trunk lid light bulbs; constant power supply for the audio head unit; instrument cluster
F29 (15)	Circuits: hazard warning switch; turn signal switch; windscreen wiper intermittent control; central locking control; engine management system diagnostic connector; junction block
F30 (20)	Central locking circuits; junction block
F31 (15)	Power circuit of the K8 fog light relay coil
F32 (30)	Power circuit of the rear window defogger relay
F36 (30)	Power circuit of relay K1 for the heater fan
F37 (5)	Circuits for the electric drives of the exterior rearview mirrors
F38 (10)	Circuits: cigarette lighter; power supply for the audio head unit from the ignition switch
F39 (10)	Circuit of relay K1 winding for the heater fan

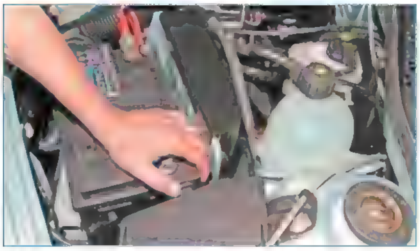
Note: Fuses F05–F08, F22–27, F33–F35 in the fuse box shown in the photo are not installed.

Removing relays and fuses

Work is performed when inspecting relays and fuses and when replacing them.

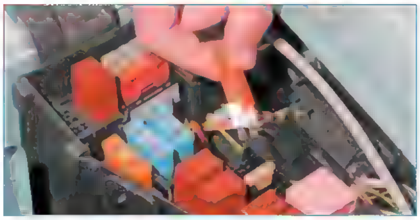
When removing relays and fuses, always disconnect the cable terminal from the battery's negative terminal.

To access the fuses and relays of the fuse box in the engine compartment...



...move the cover latch of the block to the side...

...and, pushing the cover toward the battery, we remove it. We determine a faulty fuse by the melted link. To extract a small fuse...



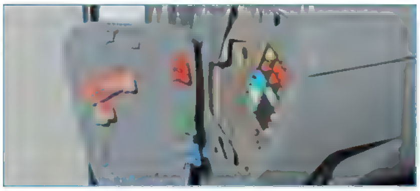
...we use the extraction tweezers located in the fuse box cover in the cabin.

Large fuses are su- we remove it by hand. If difficult...

...carefully pry it out with the blade of a flathead screwdriver. Similarly, remove relays from the block socket.

A new relay or fuse should be installed only after determining and fixing the cause of the failure. Only standard fuses rated for a specific nominal current may be used (the fuse's nominal current rating is marked on its body).

To access the fuse box in the passenger compartment, pry up the bottom of the cover with your finger and, overcoming the resistance of the clips...



...remove the cover.

Remove the fuses from the box using the fuse puller tweezers, as shown above.

Install new fuses and relays in the reverse order.

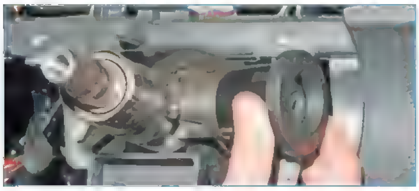
Replacing the immobilizer coil and the ignition switch

The immobilizer coil is fitted over a section of pipe (welded to the steering column tube) into which the ignition switch is inserted.

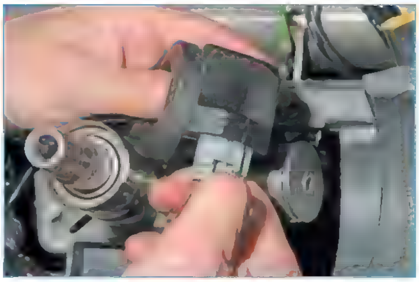
Remove the coil for replacement and when dismantling the ignition switch. Remove the ignition switch for replacement if its cylinder mechanism or contact assembly fails.

Disconnect the wire terminal from the battery "negative" post.

Remove the steering column covers (see “Removing the steering column switches and connector of the switches from the spiral cable drum assembly”, p. 267).

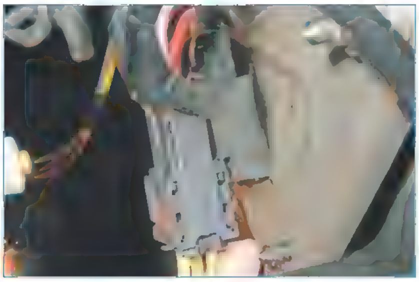


Pressing the two plastic retainers, remove the immobilizer coil viewfinder (for clarity, the steering column switches have been removed).

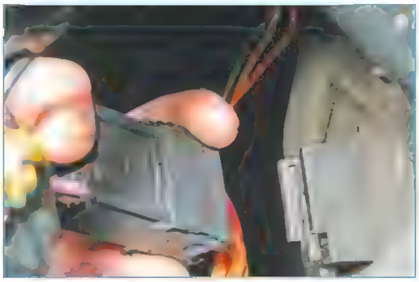


Press the connector clip and disconnect the wiring harness from the immobilizer coil.

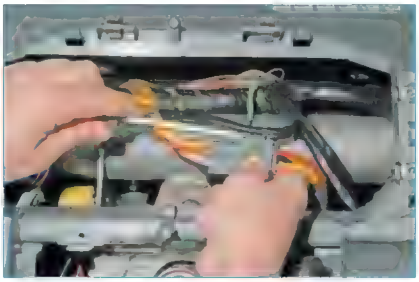
Remove the instrument cluster (see "Removing the instrument cluster", p. 276).



Press the holder lock of the connector of the ignition switch wiring...

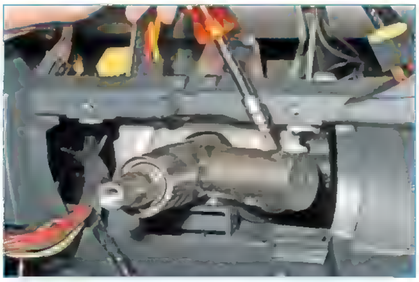


...and remove the connectors from the holder.

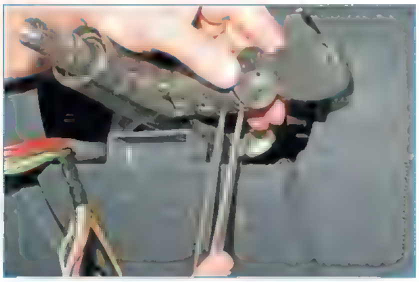


Using a slotted screwdriver, pry up the locking tab of the wiring harness connector, then slide the lock...

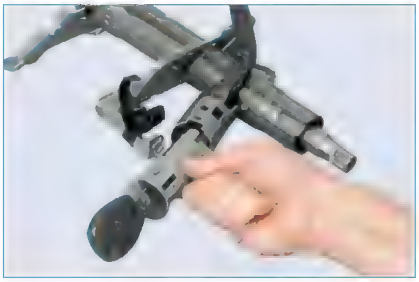
...and disconnect the wiring harness connector from the ignition switch connector.



Using a Torx T-20 wrench, loosen the mounting screw of the ignition switch.



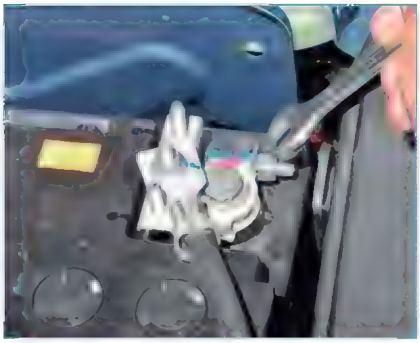
With the ignition key turned to the position between the "A" and " M" marks (as stamped on the end of the switch), use tweezers to depress the two switch locks...



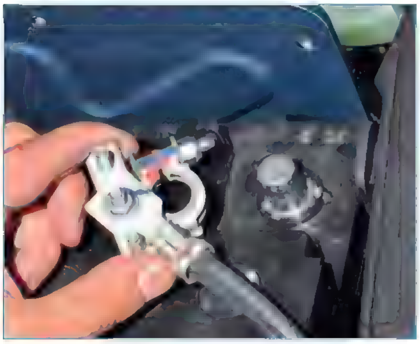
...and pull it out of the steering column housing (shown on a removed steering column for clarity). Install the ignition switch and immobilizer coil in reverse order.

Removing the Battery

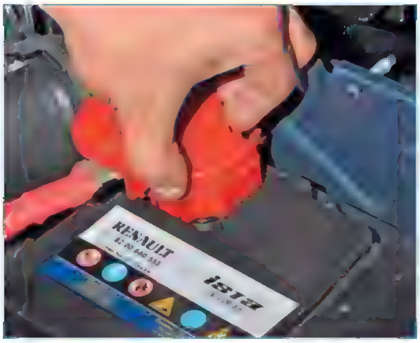
The battery is removed for charging or replacement, when removing the left engine mount. We also remove the battery to make it easier to replace bulbs in the left headlight.



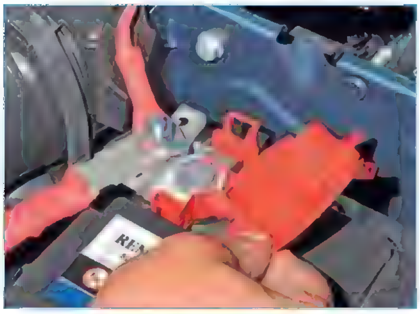
Use a 10 mm wrench to loosen the nut on the clamping bolt of the wire terminal on the battery's negative post...



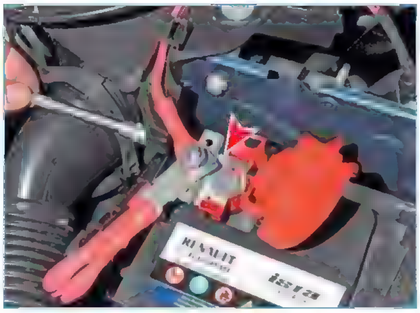
...and remove the wire terminal from the battery post.



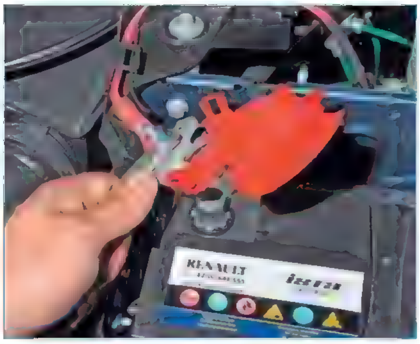
Compress the two retainers...



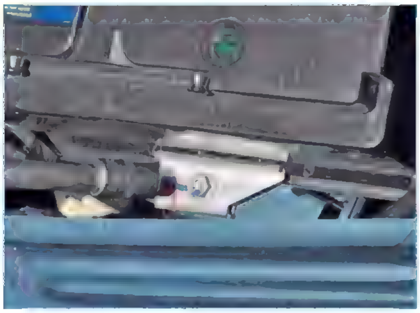
...and we open the protective cap.



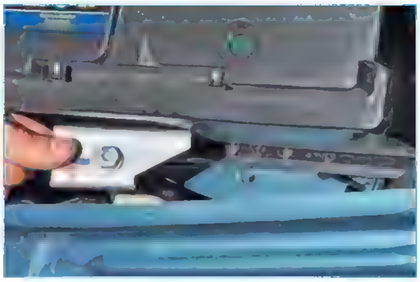
Using a 10 mm socket, loosen the clamp bolt that secures the wiring terminal on the battery's positive post...



...and remove the wire terminal from the battery post.

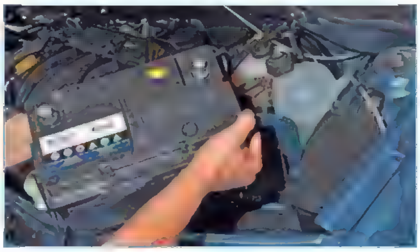


Using a 13 mm socket, unscrew the bolt that secures the battery hold-down plate...



...and remove the plate with the bolt.

Pushing the battery slightly forward (in the direction of travel), we free the protrusion at the bottom of the battery case from beneath the two brackets on the wall of the battery shelf...



...and pull the battery out of the engine compartment.

Install the battery in the reverse order.

Removal of the alternator, replacement of the voltage regulator and rectifier assembly on the 1.4–1.6 (8V) engine

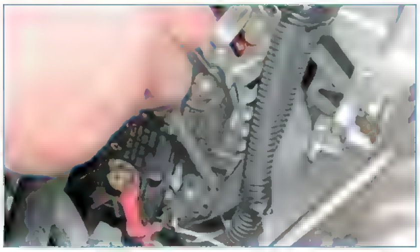
Remove the alternator for repair or replacement when it fails, as well as when the engine is being removed. It is more convenient to replace the brush holder with the voltage regulator on a removed alternator.

The procedure is shown on a vehicle equipped with power steering and air conditioning.

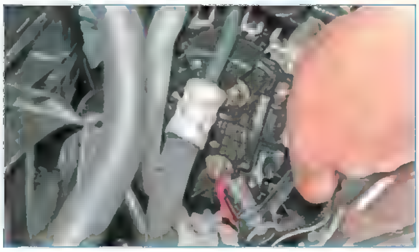
Remove the generator after positioning the car over an inspection pit or on a ramp.

Disconnect the cable terminal from the battery's negative terminal.

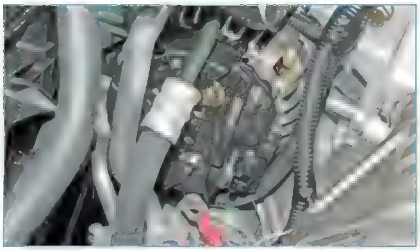
batteries. Remove the power unit cover (see “Removing the power unit cover,” p. 283). Remove the auxiliary drive belt (see “ Replacing the auxiliary drive belt for 1.4–1.6 (8V) engines,” p. 32).



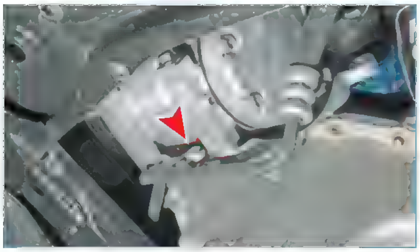
Pressing the retainer with a screwdriver, disconnect the ignition wire connector from the alternator plug.



Using a 13 mm socket, loosen the nut securing the terminal of the positive lead to the generator terminal «B2+»...

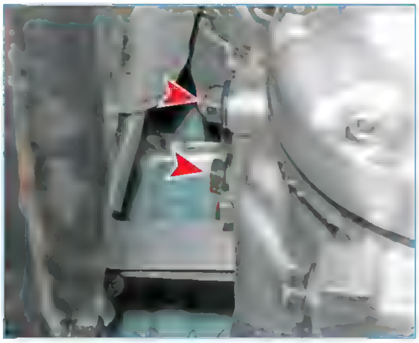


...and remove the wire terminal from the stud.



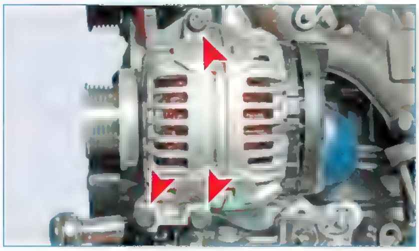
Using a 13 mm socket, loosen the bolt securing the bracket of the power steering pump pressure line tube power steering booster to the engine bracket.

Loosen the mounting bolts of the power steering pump to the engine bracket (see “Removing the power steering pump,” p. 219) and, without disconnecting the pump’s pipe and hose, move it aside.

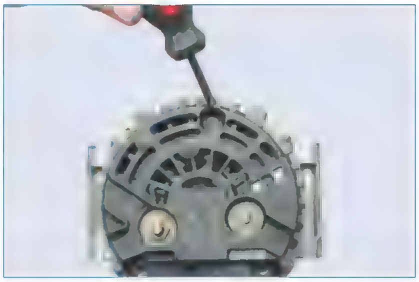


Using a box wrench or a 13 mm socket, loosen the two bolts of the alternator’s lower mounting to the engine bracket...

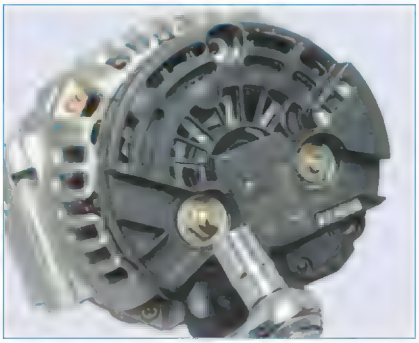
...and the upper mounting bolt.



For clarity, we show the location of the alternator mounting bolts on the removed engine. Remove the alternator. To access the brush holder with the voltage regulator and the rectifier assembly...

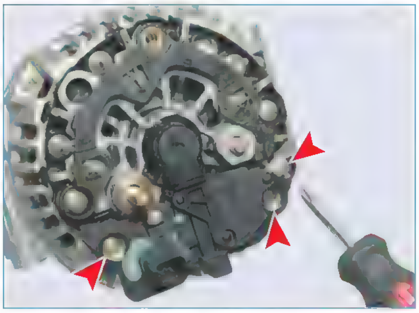


...remove the alternator cover retaining screw with a Phillips screwdriver.



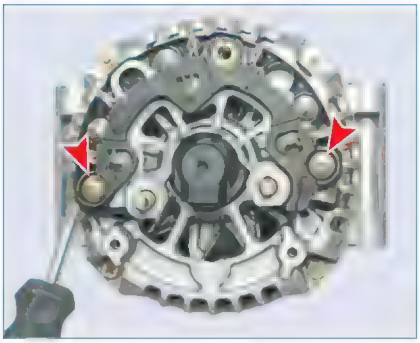
Use a 13mm socket to loosen and remove the two nuts...

...and remove the cover.



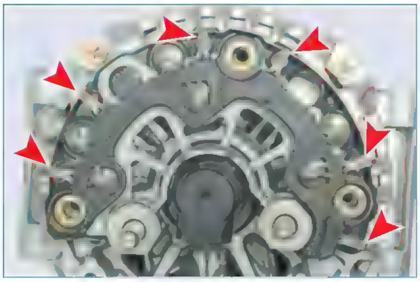
Using a Phillips screwdriver, unscrew— the three screws securing the brush holder.

Remove the brush holder from the voltage— regulator. To replace the generator's rectifier block...



...with a Phillips screwdriver we unscrew-

we remove two screws securing the unit.
Using a slotted screwdriver we spread...



...the six loop terminals of the rectifier block that crimp the stator winding leads. Remove the rectifier block.

When installing the rectifier block after crimping its loop terminals, for reliability we solder the stator winding leads to them.
Reassemble and install the generator in the reverse order.

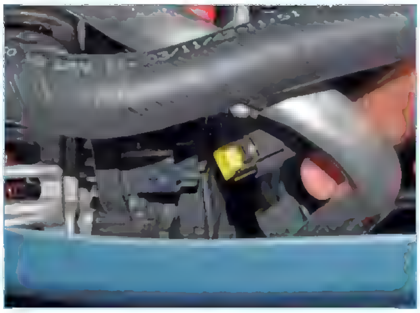
Removing the generator, replacing the voltage regulator and rectifier block on the 1.6 (16V) engine

The alternator is removed for repair or replacement when it fails, and also when the engine is disassembled. The voltage regulator and rectifier assembly are replaced on the removed alternator.

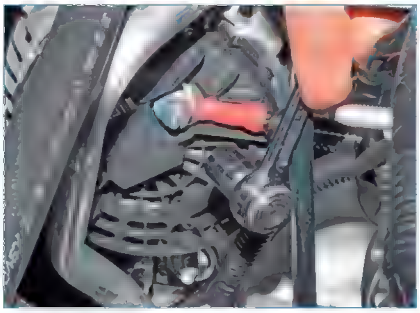
We perform the work in an inspection pit or on a ramp.

Disconnect the cable terminal from the battery's negative terminal.
Remove the front bumper (see " Removing the front bumper on the Logan," p. 286 or "Removing the front bumper on Sandero and Sandero Stepway," p. 287).

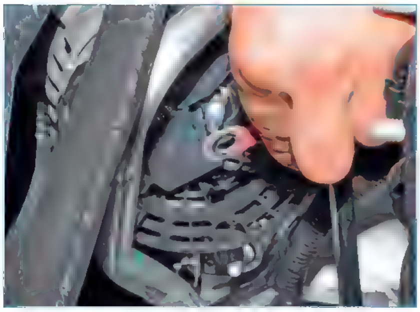
Remove the accessory drive belt (see "Replacing the accessory drive belt for the 1.6 (16V) engine," p. 41).



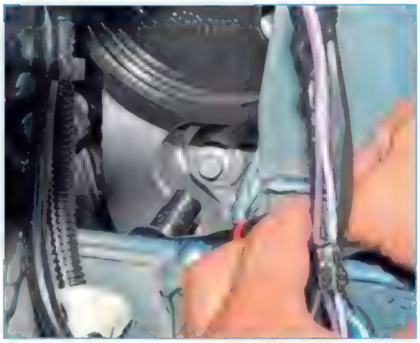
Release the retainer and disconnect the wiring harness plug from the alternator connector.



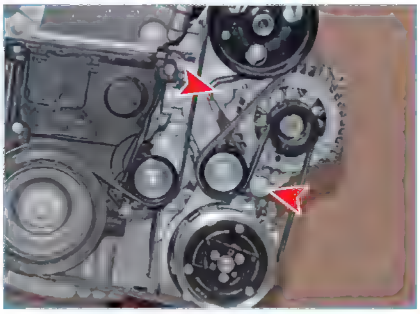
Using a 13 mm socket, loosen the nut securing the terminal of the " positive" wire to the "B2+" output of the generator...



...and remove the wire terminal from the alternator stud.

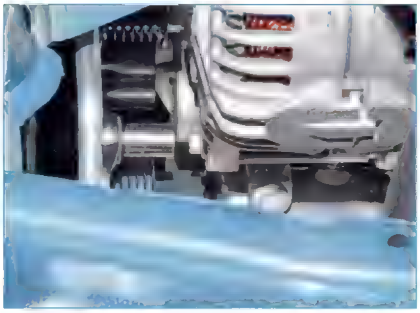


Using a 10 mm socket, loosen the alternator upper mounting bolt......and remove the bolt.

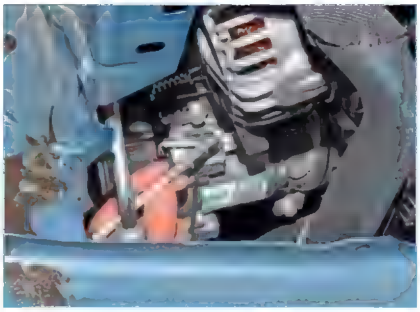


For clarity, we show the loca-
location of the alternator mounting bolts on the removed engine -

of the alternator on the removed engine.

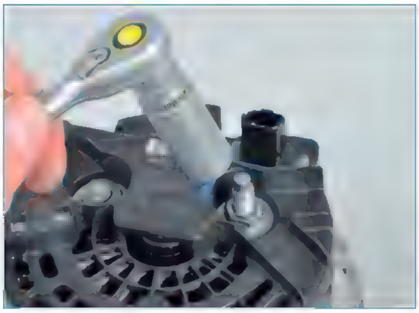


Using a 10 mm socket, loosen the lower alternator mounting bolt. While holding the alternator...

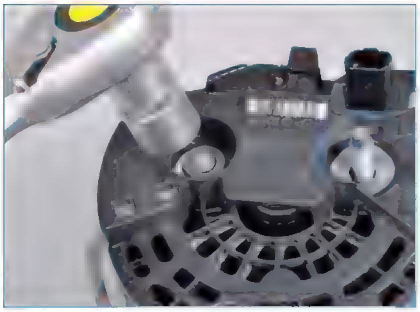


...remove the lower alternator mounting bolt...

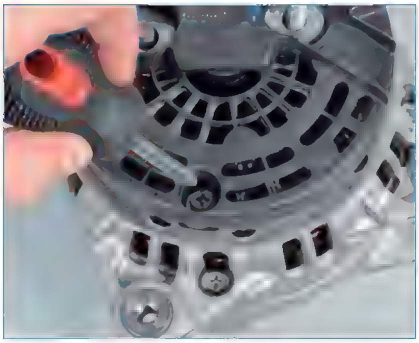
...and we pull the generator out of the engine compartment.



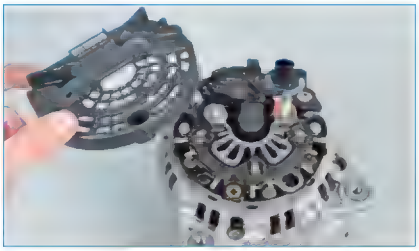
Using a 13mm deep socket, unscrew the nut on the generator terminal “V2+”.



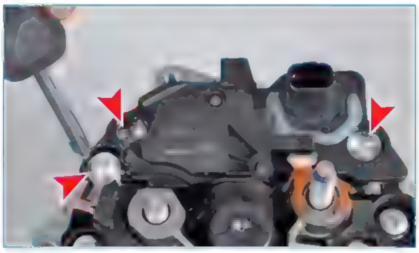
Use a 15 mm socket to loosen the nut securing the generator cover.



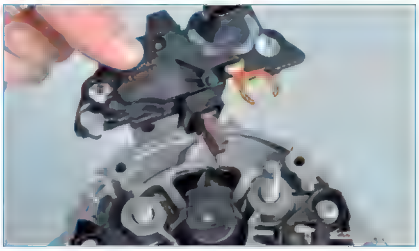
Use a Phillips screwdriver to loosen the screw securing the generator cover.



Remove the generator cover.

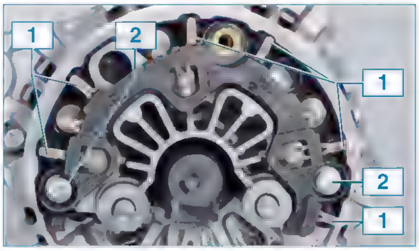


Use a Phillips screwdriver to unscrew— loosen the three screws...



...and remove the brush holder with the voltage regulator.

To replace the rectifier assembly use a slotted screwdriver to spread...



...the six terminals of the rectifier assembly that crimp the stator winding leads.

Use a Phillips screwdriver to unscrew the two screws 2 securing the assembly and remove the rectifier assembly. When installing the rectifier assembly, after crimping its terminals, solder the stator winding leads to them for reliability.

We carry out the further assembly and installation of the generator in the reverse order.

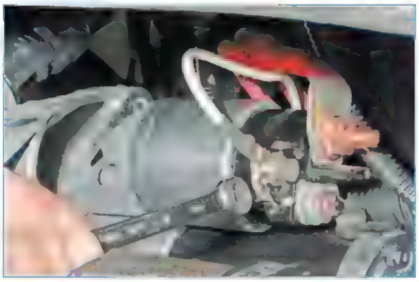
Removal and inspection of the starter

We remove the starter for repair or replacement, and also when removing the engine and gearbox. Work is performed on an inspection pit or ramp.

The starter removal procedures are shown on the car with the 1.4–1.6 (8V) engine. On the car with the 1.6 (16V) engine, the starter is removed in the same way.

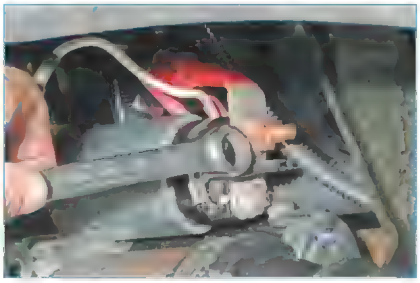
Disconnect the cable terminal from the negative terminal of the battery. Remove the power unit protection (see "Removing the power unit protection," p. 283).

From beneath the vehicle...



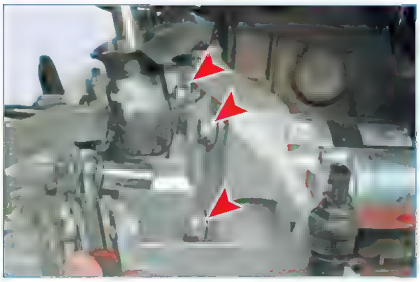
...using an open-end wrench or a 8 mm socket, loosen the nut securing the wire terminal to the control terminal of the starter relay...

...and remove the wire terminal from the relay terminal.

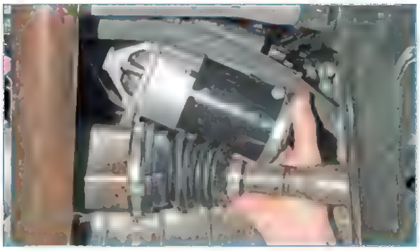


Using an open-end wrench or a 13 mm socket, loosen the nut securing the wire terminal connected to the battery's positive terminal...

...and remove the wire terminal from the contact bolt of the starter relay. In the engine compartment...

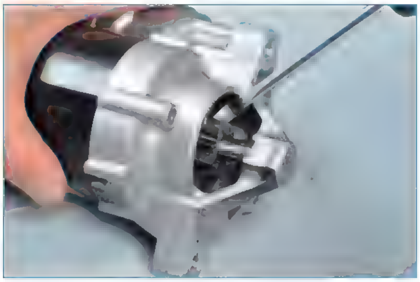


...with a 13mm socket, we unscrew the three bolts securing the starter to the clutch housing (shown on the removed power unit for clarity). From under the car...



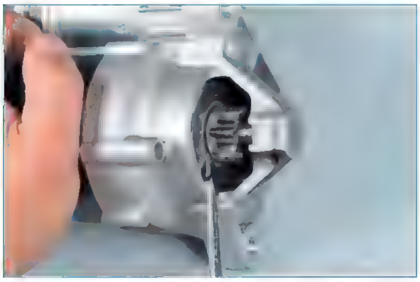
...we remove the starter.

To assess the starter drive's condition...



...we turn the drive gear with a screwdriver.

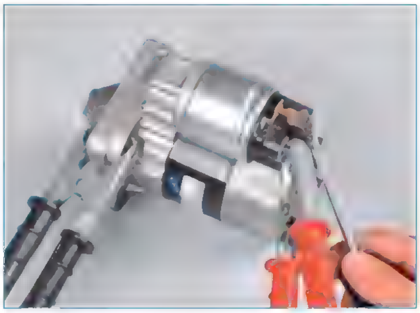
The gear should rotate in the same direction as the shaft, with the dr-water, and in the other — on the drive shaft. Otherwise, the drive must be replaced.



Using a screwdriver, slide the drive gear along the shaft.

The gear should move easily along the shaft without sticking. If the gear binds on the shaft, the drive must be replaced.

To check the starter, connect the jumper cables: the positive lead of the battery to the top contact bolt of the solenoid, and the negative lead to the starter housing.



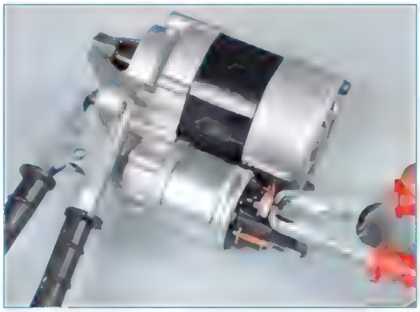
Use a screwdriver to bridge the top contact bolt and the control terminal of the solenoid.

!

Exercise caution when performing this operation, as sparks may form in the area where the terminals are shorted. Do not touch the " ground" with a screwdriver at the moment the terminals are shorted.

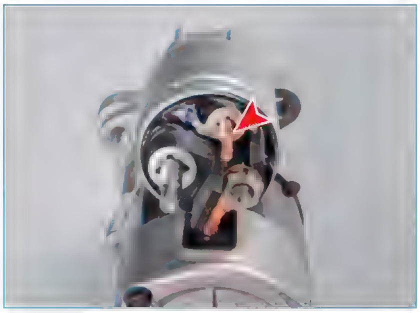
The drive gear should extend and the starter motor should engage. If not, check the starter motor and the starter pull-in relay.

for testing the electric motor...



...connect the "positive" terminal of the battery to the lower contact bolt of the pull-in relay with wires, and the "negative" terminal— to the starter housing.

The motor shaft must be rotating. Otherwise the motor is faulty. To test the traction relay, we connect with wires...

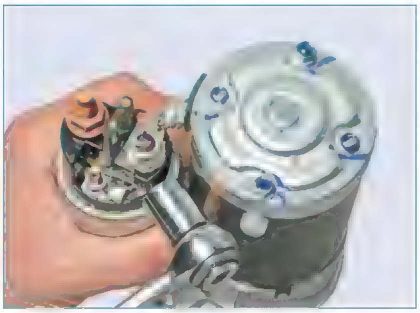


...connect the battery's "positive" terminal to the control terminal of the pull-in relay (shown by the arrow), and the "negative" terminal to the starter housing.

The drive gear should extend. If this does not happen, the pull-in relay is faulty. Reinstall the starter in the reverse order.

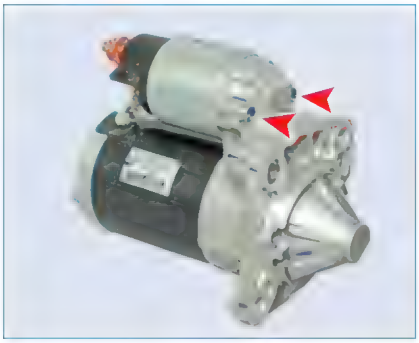
Disassembly of the 1.4–1.6 engine starter (8V)

The starter is disassembled to replace the pull-in relay, the brush holder with brushes, and the drive components. To remove the starter pull-in relay...

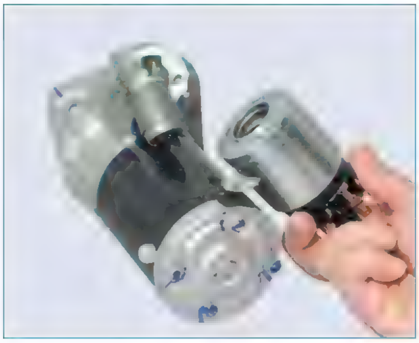


...use a 13 mm socket to loosen the nut securing the wire terminal of the brush assembly to the pull-in relay contact stud...

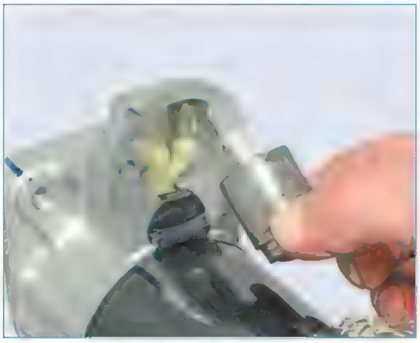
...and remove the wire terminal from the contact stud.



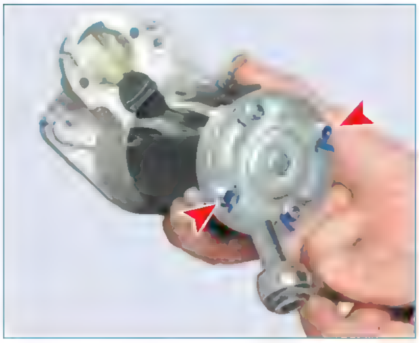
Using a Phillips screwdriver, unscrew the two mounting screws of the starter solenoid...



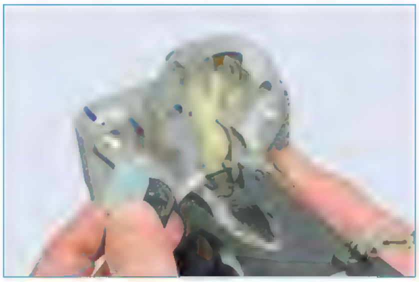
...and remove the starter solenoid.



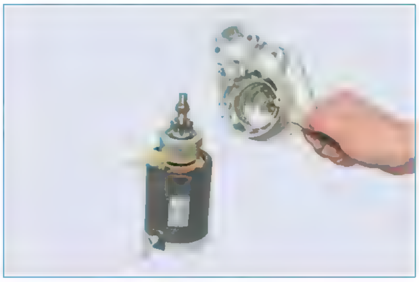
Remove the starter solenoid armature.To replace the starter drive...



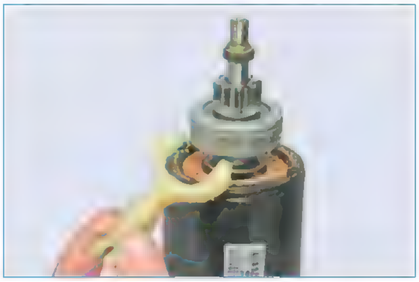
...use a socket or an 8 mm wrench to loosen the two pull bolts.



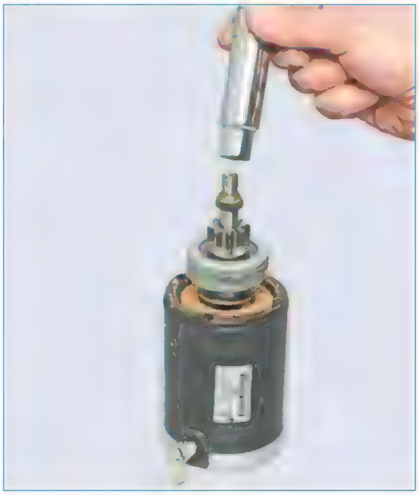
Remove the bracket and the lever seal drive gear.



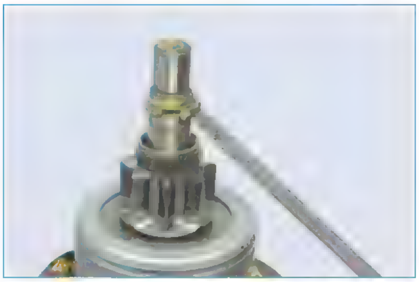
Remove the starter front cover.



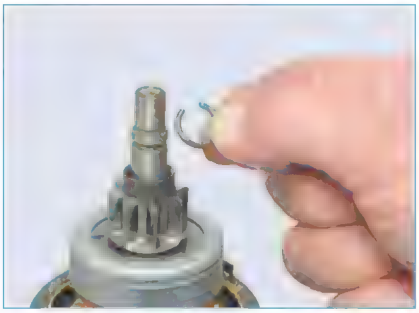
Remove the drive lever.



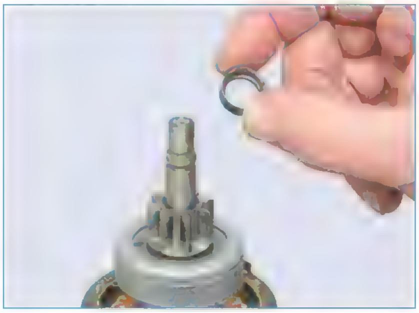
Using a drift (you can use a deep 12-point 12 mm socket), press out the limit ring of the drive gear travel.



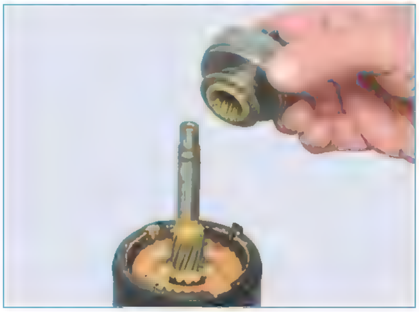
Prying with a screwdriver...



...remove it from the slot in the armature shaft circlip.

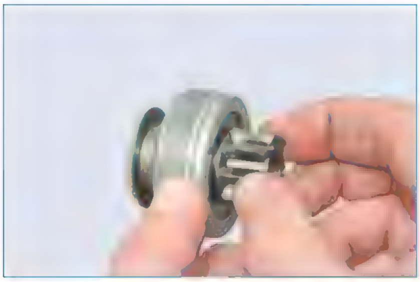


Remove the retaining ring from the armature shaft...



...and the drive assembly.

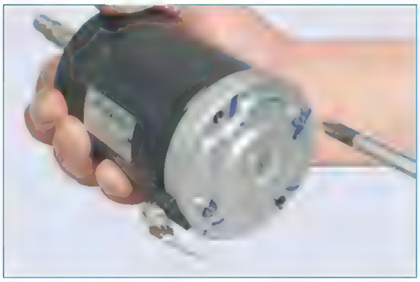
The helical splines on the shaft must be free of nicks and burrs. The free-play coupling should move easily along the shaft in the axial direction. To assess the condition of the free-play coupling...



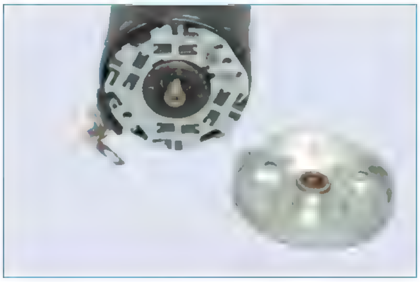
...rotate the drive gear while holding the coupling by the outer race.

The gear must rotate in only one direction. The gear teeth must not be damaged. If they are, replace the drive assembly.

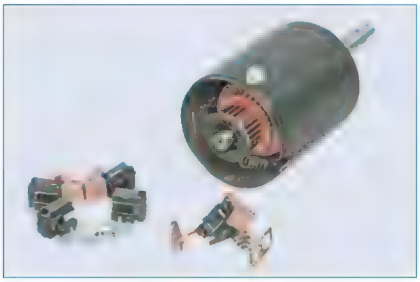
To replace the brush assembly...



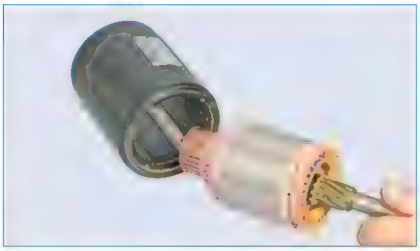
...using a Phillips screwdriver, unscrew the two screws securing the cover...



...and remove the starter cover.

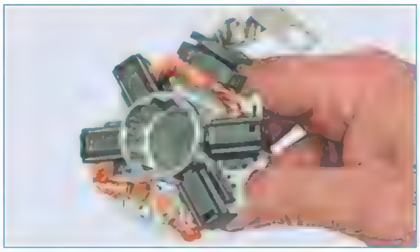


Remove the brush assembly; the brushes and springs may spring out of their guides.

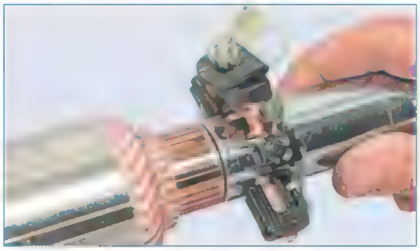


Remove the armature from the stator.

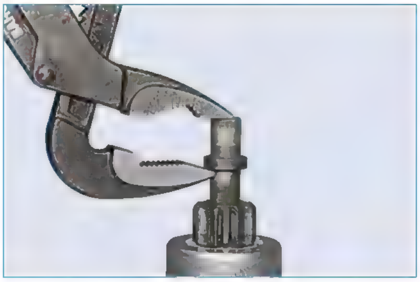
We assemble and install the starter in reverse order. Before installing the brush assembly onto the armature commutator...



...we depress the brushes into the guides and insert a drift into the central hole of the brush assembly. As a drift, you can use a tall machinist's socket whose o utside diameter equals or is slightly larger than the outside diameter of the armature commutator.



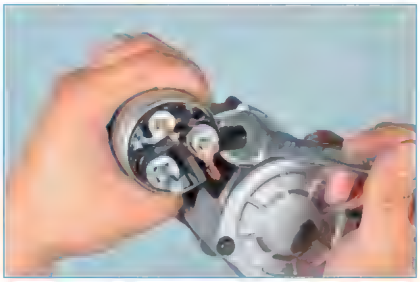
Pressing the arbor against the commutator, we slide the brush assembly off the commutator.



We place the drive gear travel limit ring onto the snap ring using slip-joint pliers.

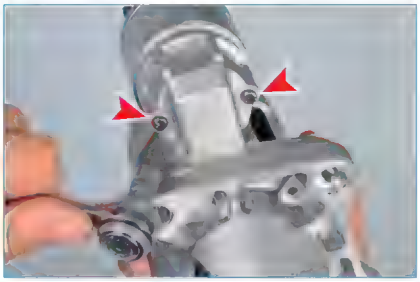
Starter disassembly for the 1.6 (16V) engine

We disassemble the starter to replace t he pull-in relay and drive components. To remove the pull-in relay...

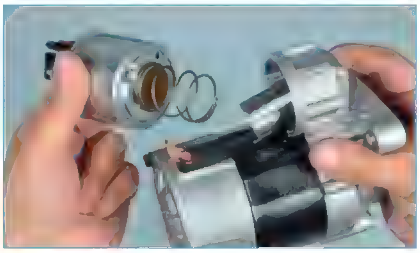


...using a 13 mm wrench, we loosen the nut that secures the brush assembly lead to the contact bolt of the solenoid...

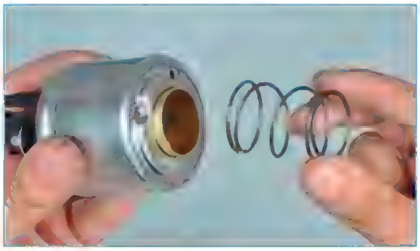
...and remove the wire from the terminal bolt.



Use a Torx T-20 wrench to unscrew the t wo mounting screws of the pull-in relay.

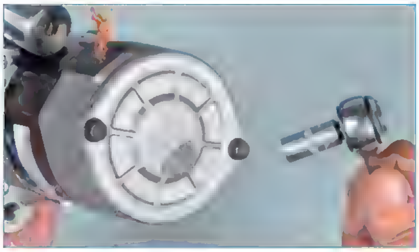


Remove the pull-in relay.

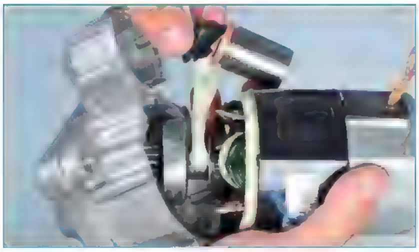


Remove the pull-in relay spring.

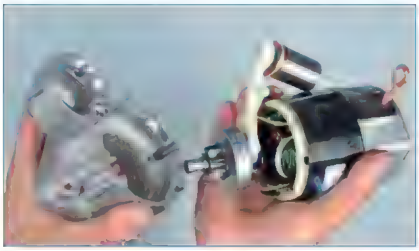
To replace the starter drive...



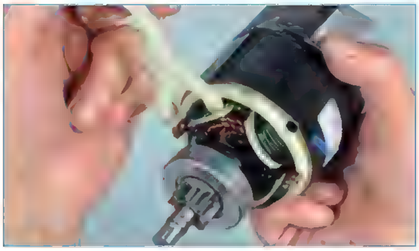
...use an 8 mm socket to loosen the two retaining bolts.



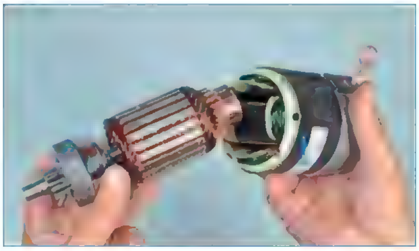
Remove the drive lever seal from the front cover...



...and remove the front cover.

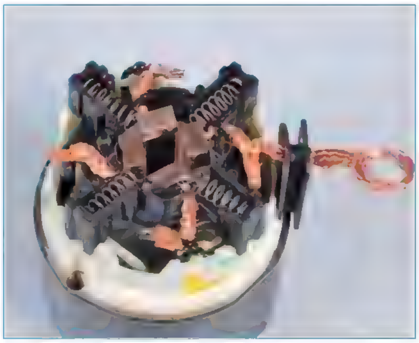


Remove the drive lever together with the armature of the pull-in relay.

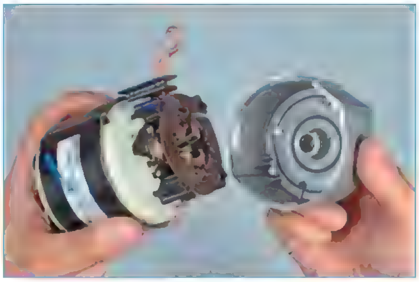


Remove the armature with the drive from the stator.

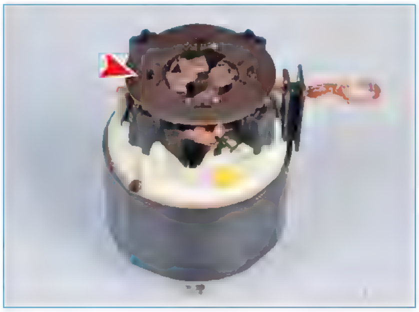
The starter drive cannot be removed from the armature shaft (the armature must be completely disassembled for that), so if the drive is faulty, replace the armature with the drive as an assembly.



The brush holder cannot be removed from the stator because the brush leads are welded to the stator winding leads. Therefore, the brush holder can only be replaced together with the stator. Reassemble the starter in reverse order. Before installing the armature...



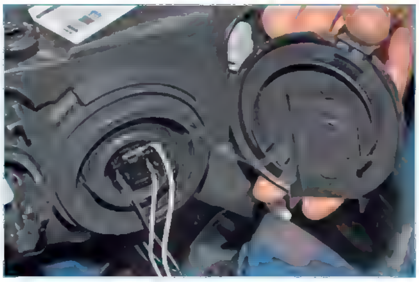
...remove the starter rear cover.



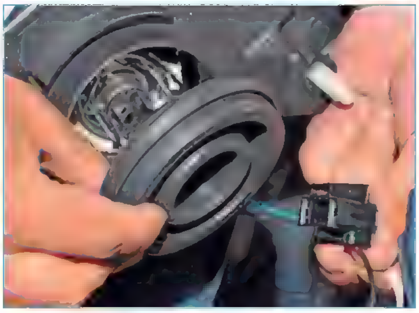
Remove the brush holder cover. Depress the brushes into the guides and insert a drift into the central hole of the brush assembly (see “Disassembling the starter of 1.4–1.6 (8V) engines,” p. 252). Insert the armature into the stator and slide the brush holder off the drift onto the armature commutator.

Replacing the bulbs in the Logan vehicle headlight assembly

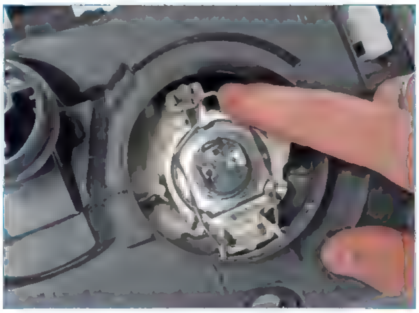
To replace the bulbs in the left headlight unit, you must remove the battery (see “Removing the battery,” p. 248). The procedure is shown for the left headlight; bulbs in the right headlight are replaced in the same way. To replace the headlight bulb...



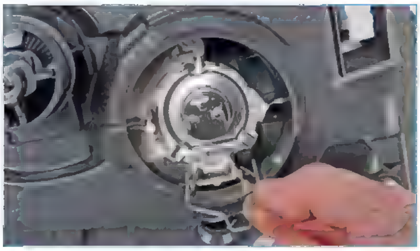
...pressing the latch, remove the plastic cover (for clarity the headlight mounting bolts are shown unscrewed and it is pulled forward).



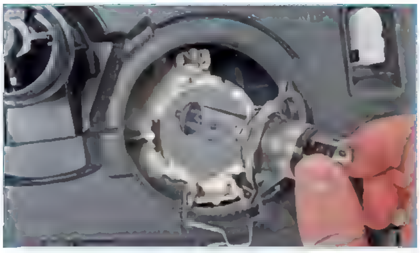
Disconnect the wire connector from the headlight bulbs and remove the rubber sealing cover.



Pressing the spring latch, disengage it from the reflector hook...



...and release the retainer.



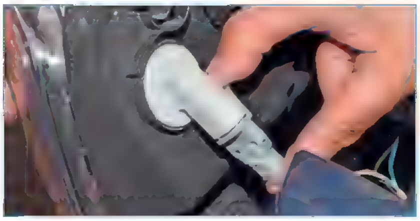
Pull the bulb out of the headlight housing—

assembly.

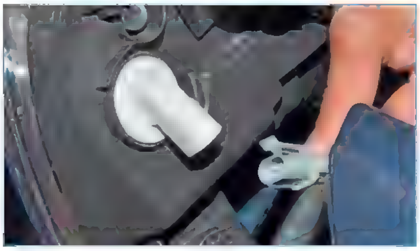
! **The headlight bulb is halogen. Do not touch its glass envelope with your fingers, as fingerprints will cause the bulb to darken when heated. Remove any contamination from the bulb with a clean cloth moistened with alcohol.**

Install the new H4 headlight bulb in the reverse order.

To replace the turn signal lamp...

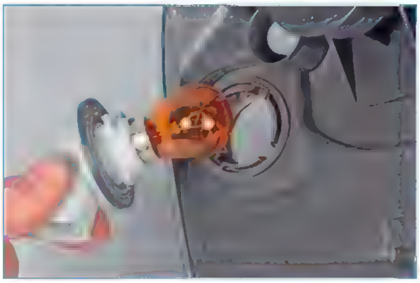


...press the pad retainer...

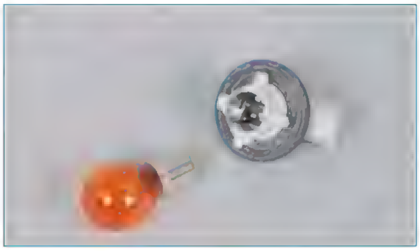


...and disconnect the wire connector from the turn signal bulb socket.

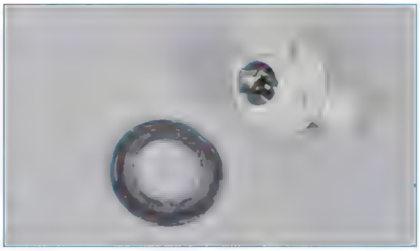
By turning the lamp socket counterclockwise (for the right headlight – clockwise)...



...remove the socket with the bulb from the headlight housing.
Pressing the bulb, turn it counterclockwise...

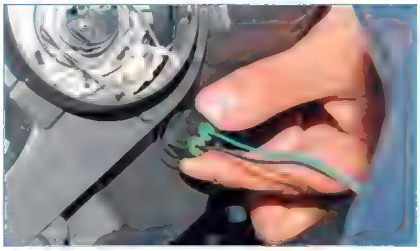


...and pull the bulb out of the socket.

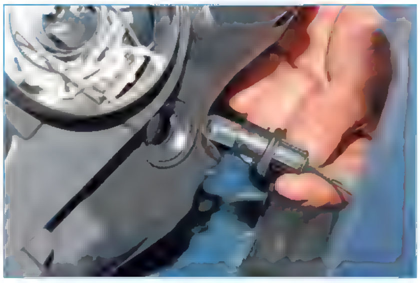


The bulb is sealed in the headlight housing with a rubber ring. If the ring is torn or cracked, replace it with a new one.

Install the new PY21W bulb by reversing the steps.
To replace the parking light bulb...



...turn the bulb socket counterclockwise...



...and pull the socket with the bulb out of the headlight housing.

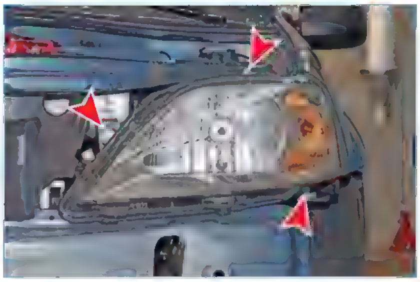
Pull the bulb out of the socket.

Install the new W5W bulb in reverse order.

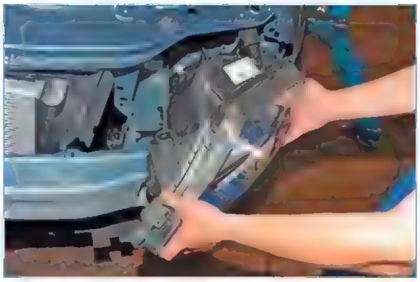
Removing the headlight on a Logan vehicle

Remove the headlight assembly for replacement. Remove the front bumper (see "Removing the front bumper on the Logan", p. 286).
Disconnect the wire connectors from the headlamp and from the turn signal lamp socket, and pull the socket with the parking light bulb out of the headlamp housing (see "Replacing bulbs in the vehicle headlamp Logan", p. 255).

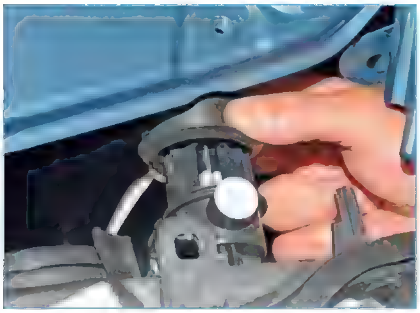
Logan", p. 255).



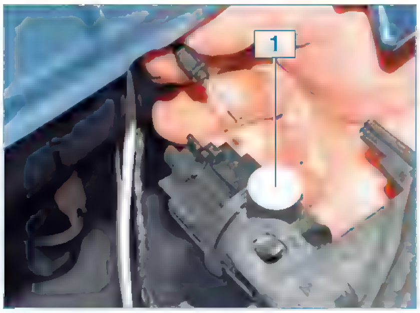
Using a 10 mm socket, unscrew the three bolts securing the headlamp to the body.



Pull the headlamp out of the body.



Remove the protective cover from the housing of the headlight beam direction actuator. Pull the cable sheath out of the holder on the actuator housing...



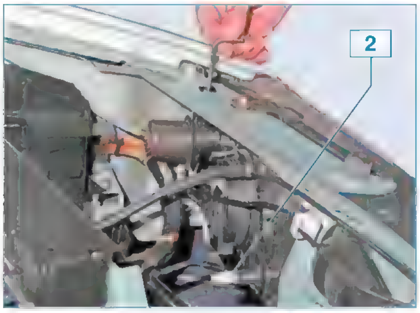
...disconnect the cable end from the actuator rod of the headlight beam direction regulator,

headlight beam direction regulator malfunction...

...and remove the headlamp.

Install the headlamp in reverse order.

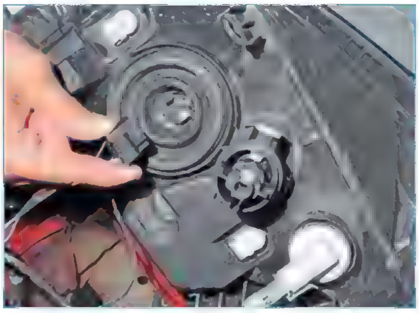
After installing the headlamp assembly, we adjust the direction of the headlight beam.



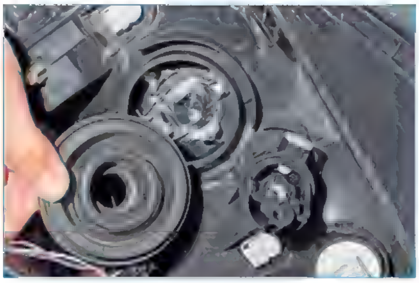
To change the beam direction in the vertical plane, turn screw 1 with a 6 mm hex key (see previous photo), inserting the hex key through the hole in the crossmember of the body. To change the beam direction in the horizontal plane, turn knob 2.

Replacing bulbs in the headlamp assembly of Sandero and Sandero Stepway vehicles

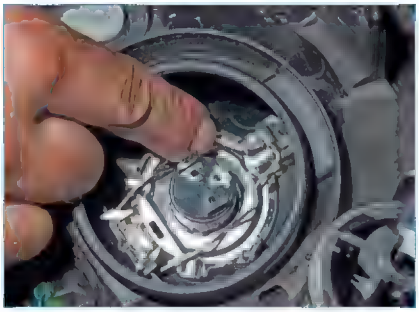
The procedure is shown on the right headlamp. For the left headlamp, the bulbs are changed in the same way, but the battery must be removed (see “ Removing the battery,” p. 248). To replace the headlight bulb...



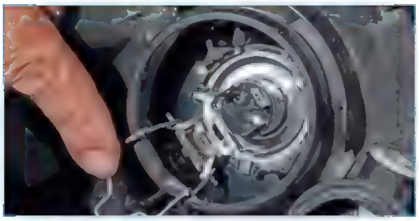
...disconnect the wiring connector from the headlight bulb (for clarity, the mounting bolts of the headlamp assembly are turned and it is pulled forward).



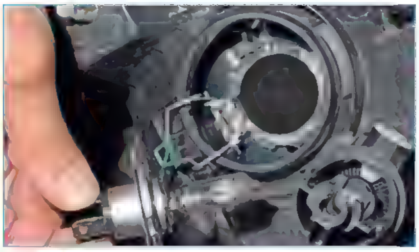
Remove the rubber sealing cover.



Pressing the spring latch, we disengage it from the reflector hook...



...and lower the retainer.



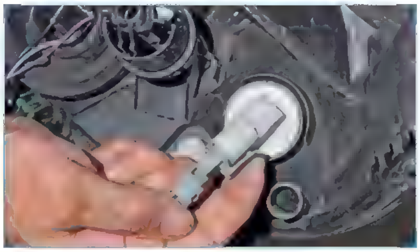
Pull the bulb out of the headlamp housing.

!

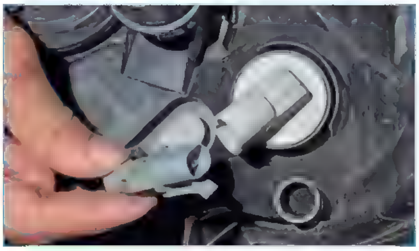
The headlight bulb is halogen. Do not touch its glass envelope with your fingers, as fingerprints will cause the bulb to darken when heated. Remove any contamination from the envelope with a clean cloth dampened with alcohol.

Install the new H4 headlight bulb in the reverse order.

To replace the turn signal bulb...

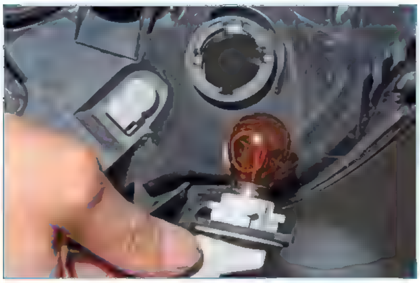


...press down the connector retainer...



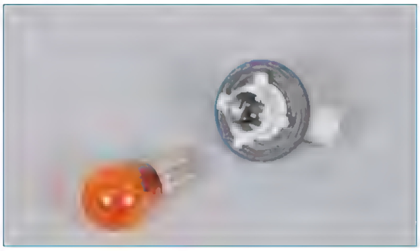
...and disconnect the wiring connector from the turn signal bulb socket.

Turning the bulb socket counterclockwise (for the left headlight — clockwise)...

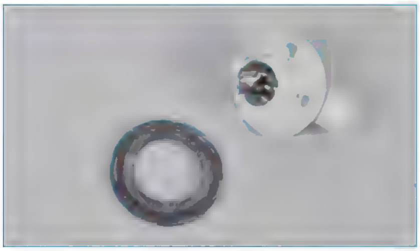


...we remove the socket with the bulb from the headlight assembly housing.

Pressing the bulb, we turn it counterclockwise...



...and pull the bulb out of the socket.

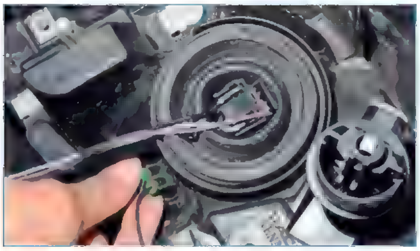


The socket is sealed in the headlight housing with a rubber ring.

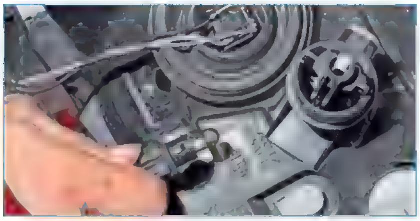
If the ring is torn or cracked, replace it with a new one.

Install the new PY21W bulb in reverse order.

To replace the parking light bulb...



...turn the bulb socket counterclockwise...



...and pull the socket out with the bulb from the headlight housing.

Pulling the bulb, we remove it from the socket.

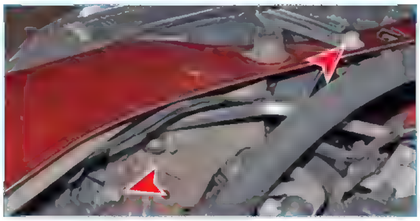
Install the new W5W bulb in reverse order.

Removing the headlight assembly on Sandero and Sandero Stepway vehicles

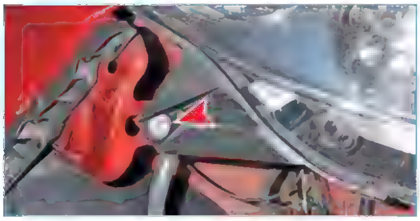
We remove the headlight assembly for replacement.

Remove the front bumper (see “ Removing the front bumper on Sandero and Sandero Stepway vehicles”, p. 287).

Disconnect the wiring connectors from the headlight bulb and from the turn signal bulb socket and we pull out the cartridge with the parking light bulb—of the parking light from the headlamp assembly—ry (see “Replacing bulbs in the headlamp unit of Sandero and Sandero Stepway cars», p. 257).



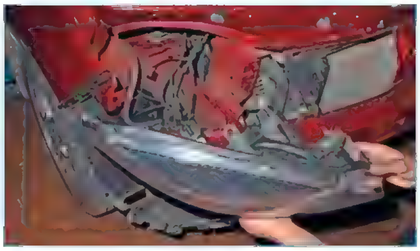
Use a 10 mm socket to loosen the bolts of the upper and side mounts...



...and the bolt of the lower mount of the headlamp to the body.

Remove the headlamp assembly from the body.

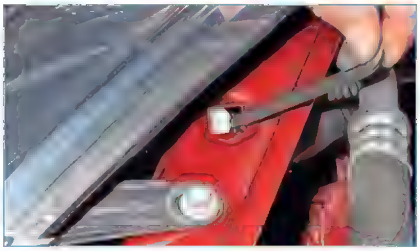
Remove the protective cover and disconnect the cable end from the actuator rod of the regulator—beam direction adjuster of the headlamps (see “Removing the headlamp on the Logan vehicle,” p. 256)...



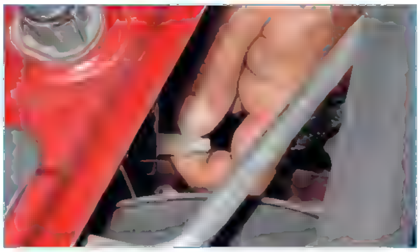
...and remove the headlamp assembly.

Install the headlamp assembly in the reverse order.

After installing the headlamp assembly, adjust the headlight beam direction.



To change the beam direction in the vertical plane, turn the screw with a 6 mm hex key by inserting the hex key through the hole in the body crossmember.



To change the beam direction in the horizontal plane, turn the knob.

Removing the headlight beam direction actuator

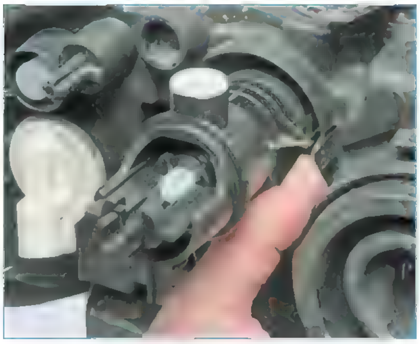
The headlight beam direction actuator is removed for replacement if it fails.

The procedure is shown on a Logan vehicle; on Sandero and Sandero Stepway vehicles the work is carried out similarly.
We demonstrate removal of the mechanism on the left headlight assembly (for clarity of the operation we show it on a detached headlight assembly).

For easier removal of the actuator on the left headlight assembly, we remove the battery.

Before disconnecting the end of the drive cable from the regulator actuator, turn the headlight beam direction adjuster knob (inside the vehicle) all the way to the left.

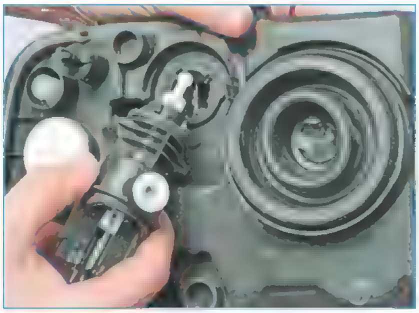
Disconnect the drive cable end from the regulator actuator (see “ Removing the headlight assembly on the Logan vehicle,” p. 256).



Depress the latch on the housing of the headlight...

headlight...

...rotate the actuator housing of the headlight beam direction regulator clockwise. On the right headlight, rotate the regulator housing counterclockwise...



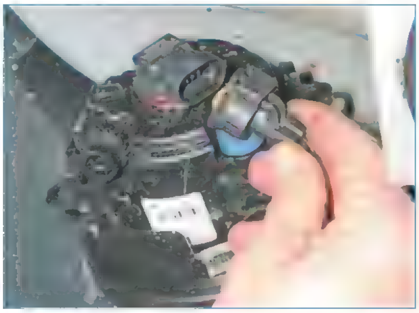
...and pull the regulator actuator out of the headlight assembly housing.

Install the actuator for the headlight beam direction regulator in the reverse order.

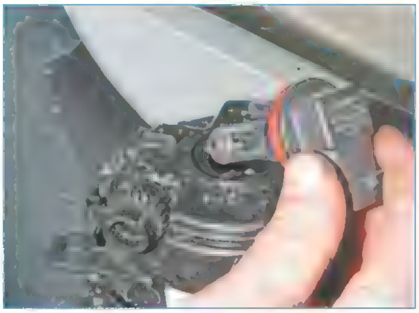
Before securing the actuator housing in the headlight assembly, make sure the rod end of the mechanism has engaged the corresponding socket in the headlight reflector — when rocking the regulator actuator housing in the vertical plane, the headlight reflector should rotate.

Replacing the fog light bulb

Perform the work over an inspection pit or on a ramp.
Remove the front bumper splash shield on the side of the bulb being replaced (see "Removing the front bumper splash shields," p. 283).
Squeeze the plastic retainer of the wire connector...



...and disconnect it from the bulb.



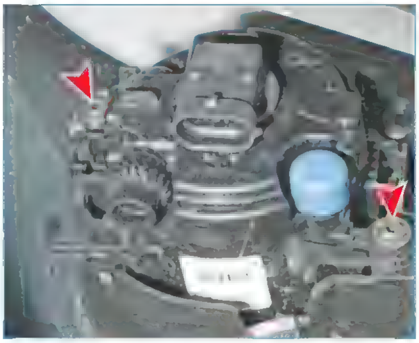
Turning against hourly
release the clips and remove the bulb.

Replace the faulty bulb with a new H11 and reinstall the parts in reverse order.

Removing the fog light

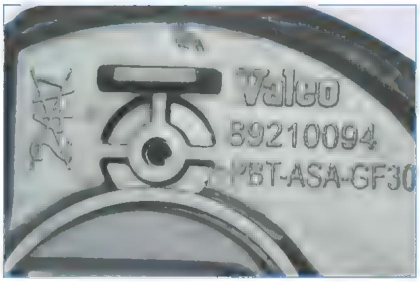
Remove the fog light for replacement.
Perform the work over an inspection pit or on a ramp.
The procedure is shown on the left fog light; the right fog light is replaced in the same way.

Remove the front bumper mudguard on the side of the headlight being replaced (see “ Removing the front bumper mudguards”, p. 283).
Disconnect the wiring connector from the fog lamp (see “Replacing the fog lamp”).



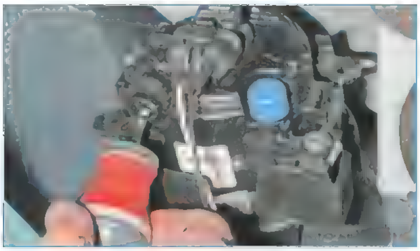
Use a Torx T-20 wrench to loosen the two screws securing the headlight to the bumper...

...and remove the headlight.



Fog light marking

Install the fog light in the reverse order. After installing the light, adjust the beam direction in the vertical plane.

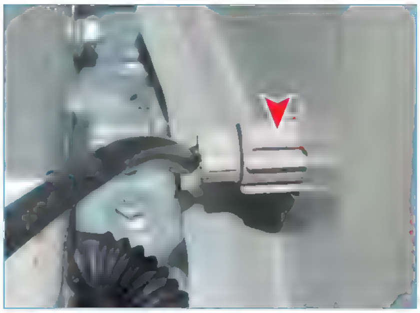


Turn the plastic adjustment screw with a flat-head screwdriver clockwise to raise the beam, or counterclockwise to lower it.

Removing the side turn signal, replacing the bulb on a Logan

Remove the side turn signal to replace the bulb or the signal unit itself.

The work is shown on the left side turn signal; the right side turn signal is removed in the same way.



The side turn signal is installed in an opening in the body wing and is held by two retainers (one retainer is shown by the arrow; the other retainer is not visible in the photo). There are two ways to remove the side turn signal.

In one method, remove the front wheel splash guard (see "Removing the front wheel splash guards and inner fenders," p. 284).

Bending back the rear part of the inner fender, slip your hand into the gap between the inner fender and the wing and, squeezing the two retainers of the turn signal...

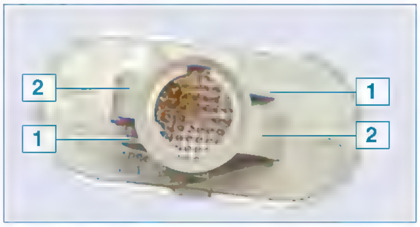
...push the signal out of the wing opening.

With the other method, we remove the turn indicator by compressing its retainers from the outside of the wing. For this...

...insert two plastic plates (you can use plastic cards) between the wing and the signal on both sides and, squeezing the two retainers...

...pull the side signal out.

gate.



Next to the fasteners 2 on the turn signal housing there are two projections 1

Therefore, when removing the left turn indicator, we insert the front plate lower than the projection, and the rear one — higher than the projection.

When removing the right turn signal, insert the plate the other way around.

By turning the lamp holder counterclockwise...

...we pull it out of the indicator housing.

Removing the bulb...

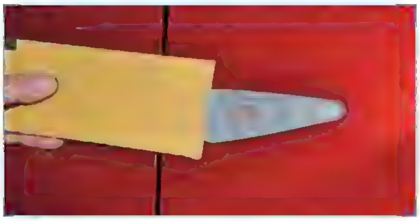
...and replacing it with a new WY5W.

Reinstall the side turn signal in reverse order.

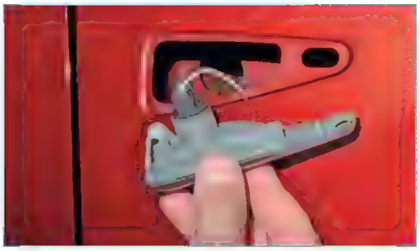
Removing the side turn signal and replacing the bulb on Sandero and Sandero Stepway vehicles

Remove the side turn signal to replace the bulb or the signal unit itself.

The work is shown on the right side turn signal; the left side turn signal i s removed in the same way.



Insert a cardboard or plastic plate between the wing and the pointer and, by pressing the lock...



...we pull the indicator out of the hole in the wing.

Turning the lamp socket counterclockwise...

...we pull the socket with the l amp out of the indicator housing.

Pull the lamp out of the socket...

...and replace it with a new W5W.

We install the side turn signal in the reverse order.

ности.

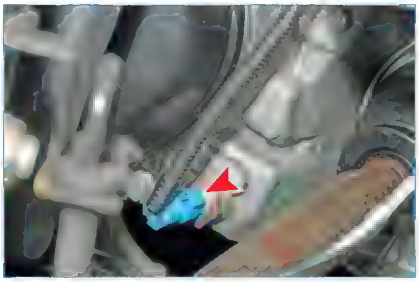
Removing the reverse light switch

Perform this procedure when inspecting or replacing the re verse light switch.

Remove the switch when on an inspection pit or on a ramp.

Remove the left engine compartment splash shield (see “ Removal of engine compartment splash shields,” p. 000).

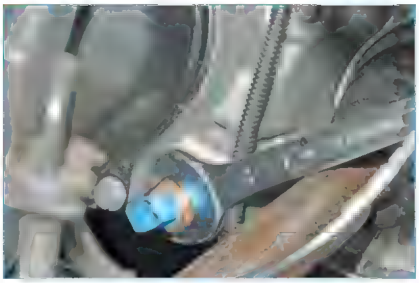
Clean the reverse light switch and the area of the gearbox housing around the switch from dirt.



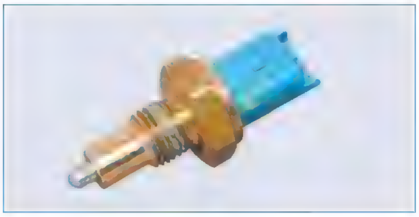
After releasing the wiring connector clip......disconnect the connector from the reverse light switch.

With the ignition on, short the switch connector contacts using a piece of wire. If the reverse light does not illuminate, check the switch's electrical circuit.

Otherwise, the switch must be replaced with a new one. Before unscrewing the switch, drain the oil from the gearbox (see " Checking and topping up the oil in the manual gearbox", p. 47).

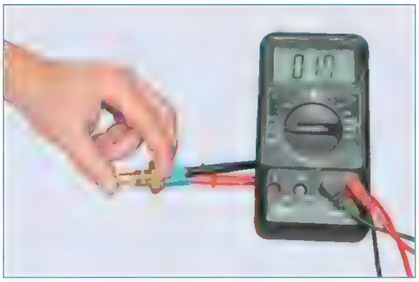


With a 24 mm wrench, turn the reverse light switch.



Reverse light switch

Connect the tester probes to the switch terminals and, in ohmmeter mode, perform a check of the s witch. For a serviceable switch, with its plunger in the free position the tester should indicate "infinity"...



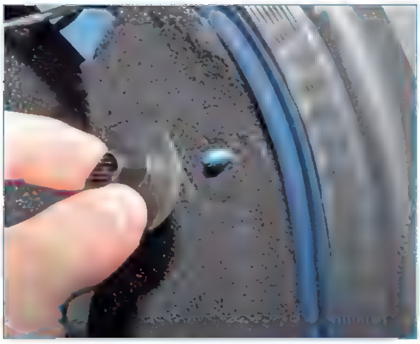
...and when the rod is "recessed" (the switch contacts are closed) — presence of the circuit.

Before installing the switch, degrease the threaded part of the switch and the threaded hole in the transmission housing with acetone. Apply a thin layer of sealant to the switch threads and screw the switch into the transmission housing hole. Tighten the reverse light switch. Pour oil into the gearbox. Reassemble in the reverse order.

Removing the rear light, replacing bulbs on the Logan

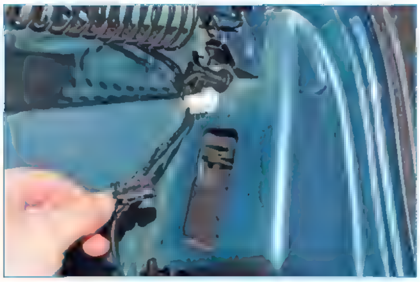
This work is carried out when replacing bulbs in the rear light or the light assembly itself. The operations are shown for the right-hand light; they are similar for the left-hand light.

Open the trunk...

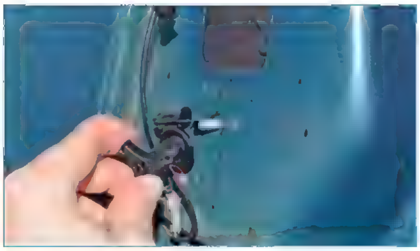


...and unscrew the trunk trim fastening push rivet.

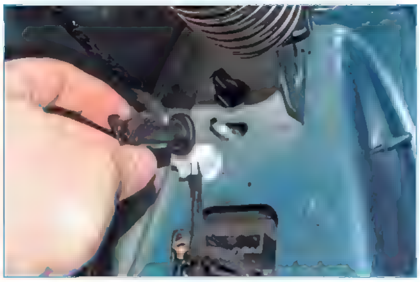
Fold back the trunk lining edge.



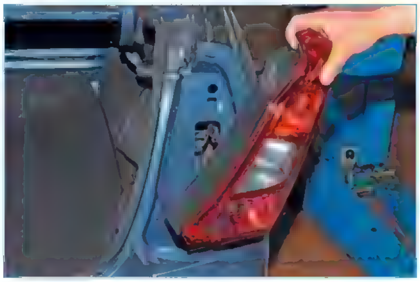
Press the latch and disconnect the wire connector from the tail light socket.



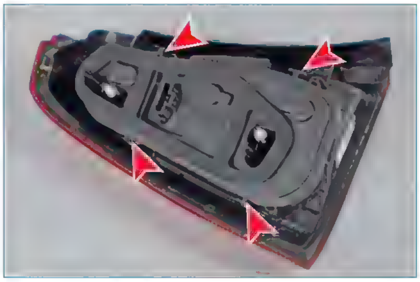
Unscrew the lower...



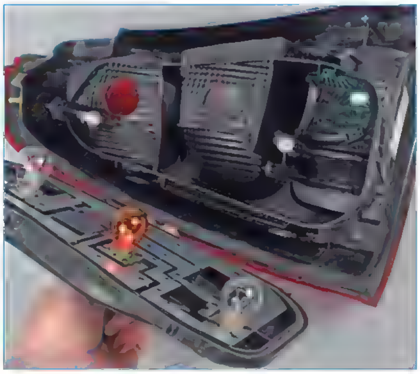
...and the upper plastic nuts securing the light.



Remove the rear light.



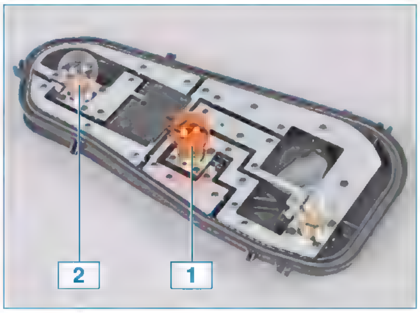
Depress the four clips...



...и снимаем держатель с лампами. By pressing the bulb and turning it counterclockwise...

...we pull the reverse light bulb out of the holder.

Install the new P21W bulb in reverse order.



Similarly, replace the turn signal bulbs 1 (PY21W) and the dual-filament brake/taillight bulb 2 (P21/5W).

The projections on the base of the combined brake/taillight bulb are at different heights and, when installing,

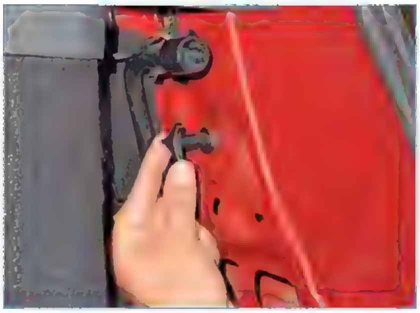
must fit into the corresponding slots of the socket. Reinstall the rear lamp in the...

of the sequence.

Removing the rear lamp and replacing bulbs on Sandero and Sandero Stepway vehicles

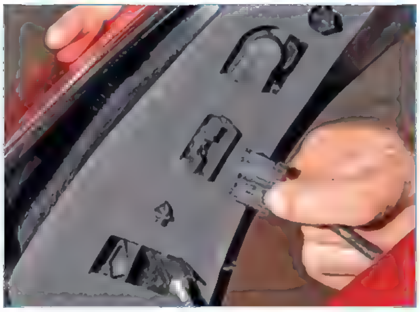
Work performed when replacing bulbs in the rear lamp or when replacing the lamp unit itself.
The operations are shown on the right-hand lamp; they are the same for the left-hand lamp.

Open the boot/trunk lid...



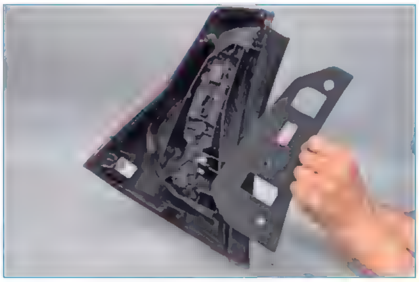
...unscrew the plastic nut securing the lamp.

Pull the lamp away from the vehicle body.

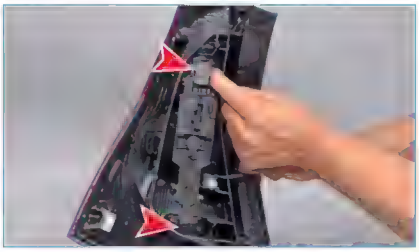


Press the latch and disconnect the wiring connector from the lamp...

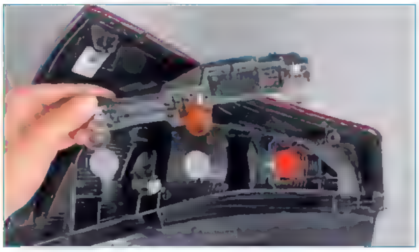
...and remove the lamp.



Remove the lamp gasket.



Release the three clips...

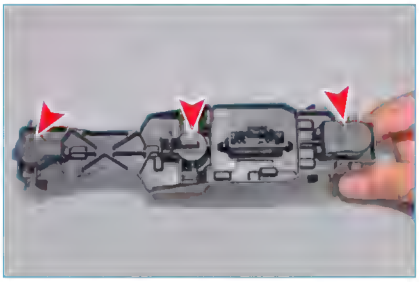


...и снимаем держатель с лампами. By pressing the bulb and turning it a proturn clockwise...

...remove the combined brake light and tail/position light bulb from the holder.

Install the new P21/5W bulb in reverse order. The tabs on the base of the combined brake/parking lamp are at different heights and must engage the corresponding slots in the socket when installed.

Similarly replace the turn signal bulb (PY21W) and the reverse light bulb (P21W) (the fog light bulb in the left lamp).



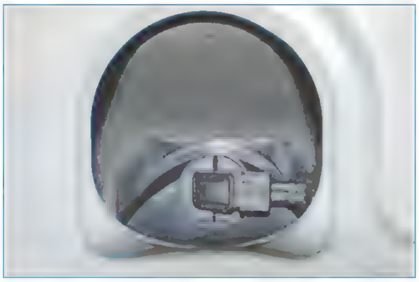
The bulb type is indicated on each bulb socket of the holder.

Reinstall the rear lamp in the reverse order.

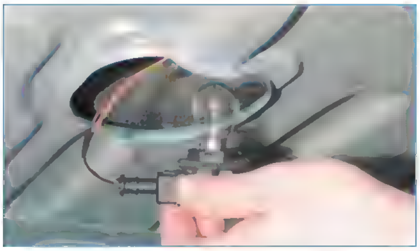
Replacement of the auxiliary brake light bulb on the Logan vehicle

An additional brake light is installed in the vehicle cabin on the rear parcel shelf.

To access the additional brake light, open and lift the trunk lid.



Inside the trunk, through the hole in the rear parcel shelf, turn the lamp socket counterclockwise...



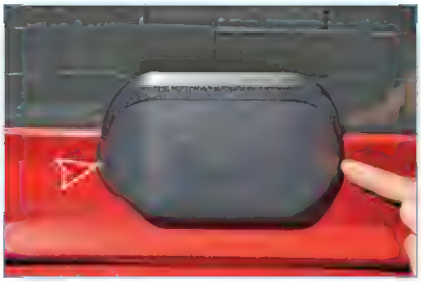
...and remove the socket with the bulb. Pressing the bulb and turning it counterclockwise, pull the bulb out of the socket.

Install a new P21W bulb in reverse order.

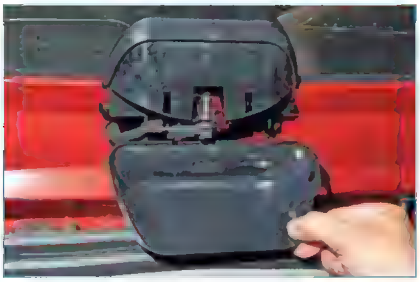
Replacing the bulb in the high-mounted brake light, removal of the light on Sandero and Sandero Stepway vehicles

The high-mounted brake light is installed on the tailgate.

Open the trunk lid...

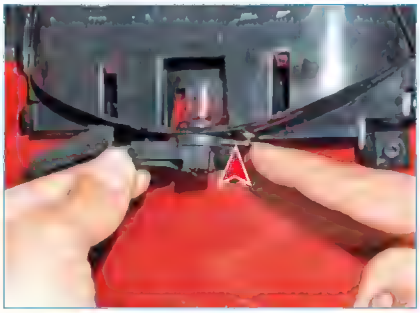


...and press the two retainers...

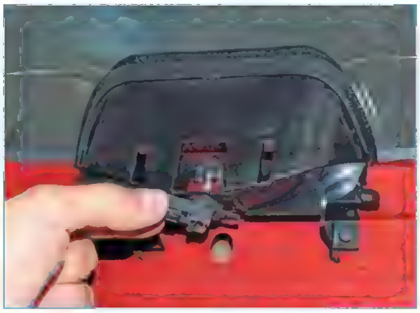


...remove the cover of the additional signal.

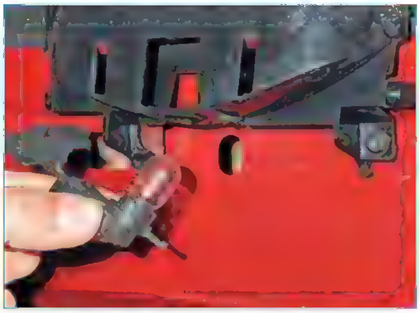
To replace the bulb...



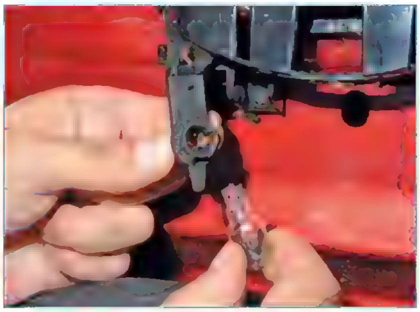
...press the lamp holder's clip down...



...and turn the bulb socket clockwise.



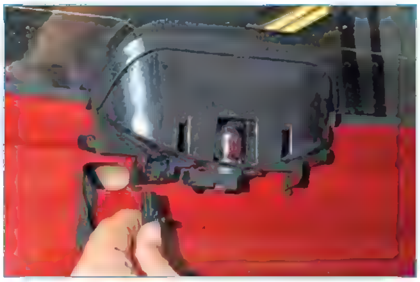
Remove the bulb holder from the signal housing.



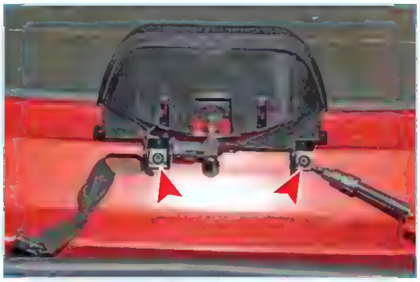
Remove the bulb from the holder.

Install the new W16W bulb in reverse order.

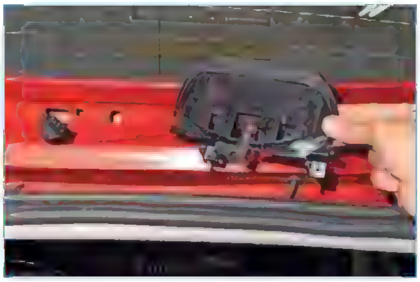
To remove the additional signal...



...pressing the latch, disconnect the wiring connector from the lamp socket.



Use a Torx T-20 key to loosen the two screws securing the signal.



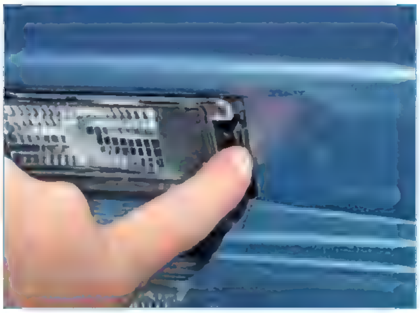
Removing the auxiliary brake light.

Installing the auxiliary signal in reverse order. sequence.

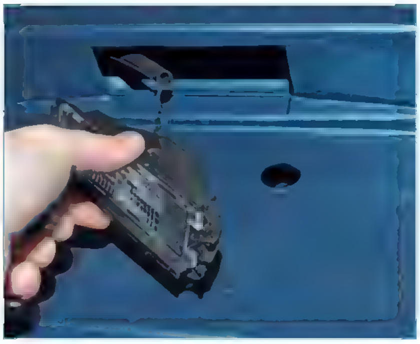
Removing the license plate light, replacing the bulb

Remove the rear license plate light to replace the bulb, the housing itself, or when removing the rear bumper.

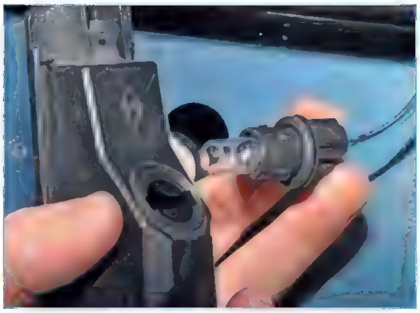
The procedures are shown on the Logan vehicle; the work is performed similarly on Sandero and Sandero Stepway vehicles.



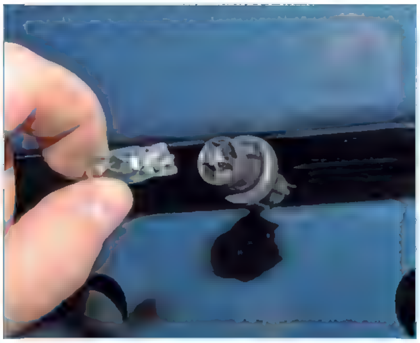
Pressing the plastic retainer...



...we pull the lamp out of the rear bumper opening.



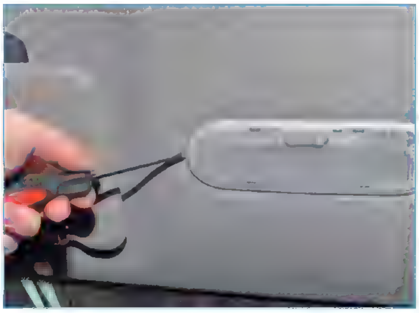
Turning counterclockwise, we remove the bulb socket from the lamp housing.



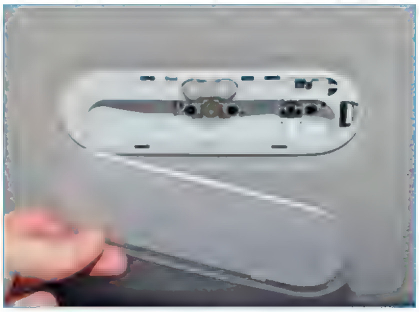
Remove the bulb from the socket. Install the new W5W bulb in reverse order.

Replacing the interior light bulb, removing the lens

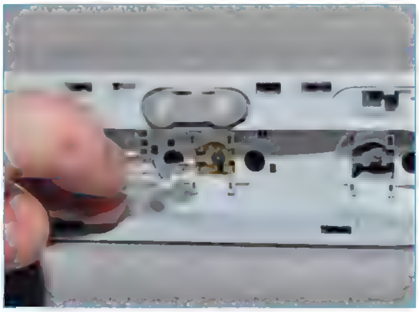
We remove the interior light fixture to replace it or when removing the headliner during body repairs. Disconnect the wire terminal from the negative terminal of the battery. To replace the bulb...



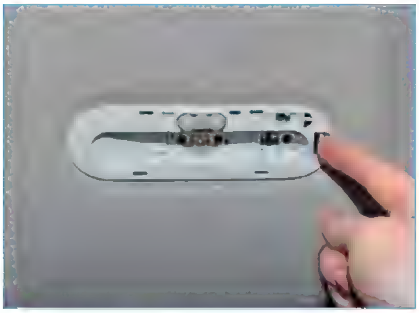
...pry it up with a screwdriver...



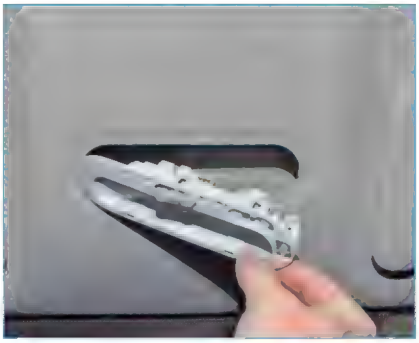
...and remove the fixture diffuser.



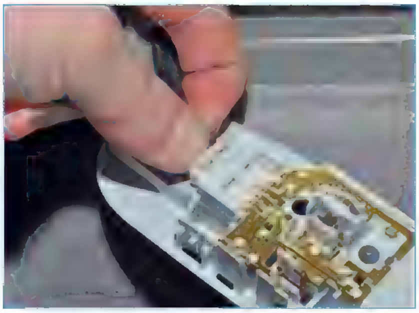
Pull the bulb out of the fixture. Install the new W5W bulb in reverse order. If the individual reading light contains a bulb, replace it the same way. To remove the fixture, remove the diffuser as shown above.



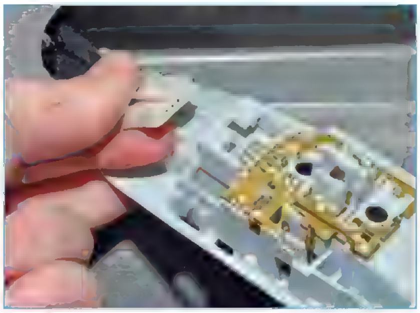
Pressing the plastic retainer...



...pull the fixture out of the headliner.



Pressing the pad lock...



...disconnect the wire connector
from the dome light connector...

...and remove the dome light.

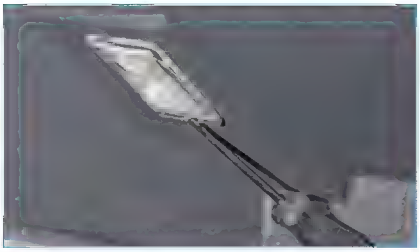
Install the interior light assembly in the reverse order.

of
r
e
moval.

Removing the glove box light cover, replacing the bulb, replacing the switch

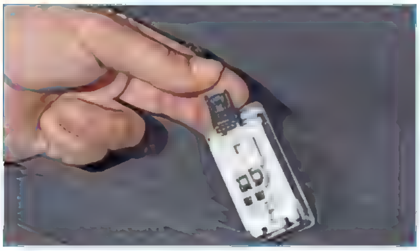
Remove the light cover when replacing the bulb or the glove box light cover.

To replace the light bulb, open the glove box...



...pry the light cover with a screwdriver...

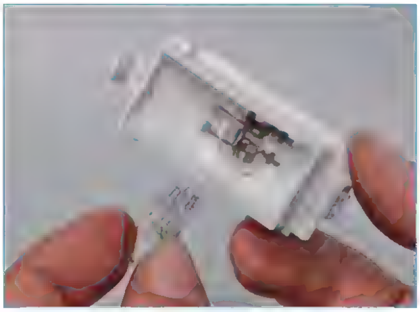
...and pull the light cover out of the glove box opening.



Pressing the latch, disconnect the wire block from the ceiling lamp connector.

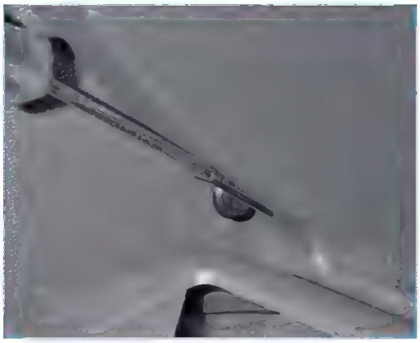
Pressing the latch...

...remove the lamp diffuser.



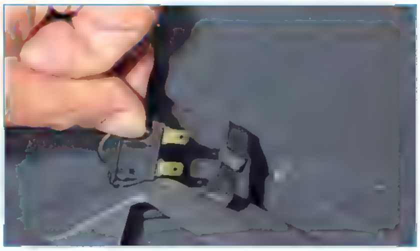
Pull the bulb out of the ceiling lamp.

Install the new W5W bulb in the reverse order. To replace the ceiling lamp switch, open the glove compartment...



...use a screwdriver to pry the switch...

...and pull the switch out of the glove compartment opening.



Disconnect the two wire connectors from the switch terminals...

...and pull the switch out of the glove compartment.

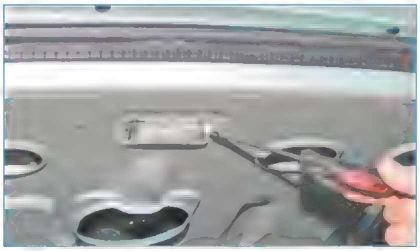
Install the glove compartment lamp switch in the reverse order.

Removing the trunk light cover, replacing the bulb on a Logan vehicle

Work is carried out when replacing the bulb or the trunk light cover. The trunk light cover is installed on the rear parcel shelf, on the trunk compartment side.

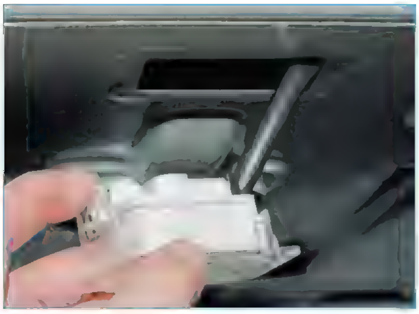
Disconnect the wire terminal from the battery's negative terminal.

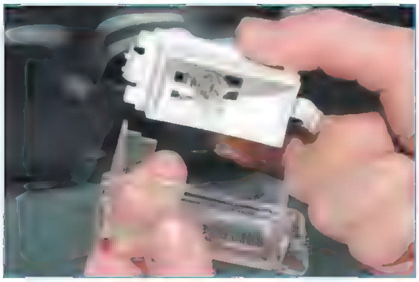
To access the light cover, open and lift the trunk lid. To replace the bulb...

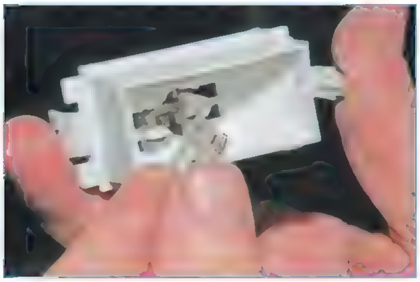


...pry the light cover with a screwdriver...

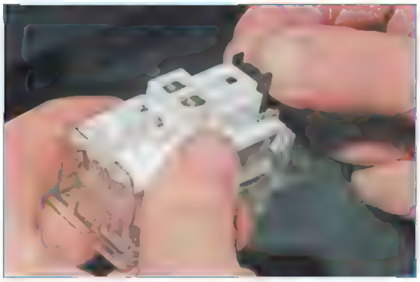
...and pull it out of the hole in the rear shelf.


Press the plastic retainer...


...and remove the lens cover.


Pull the bulb out of the lamp housing. Insert a new W5W bulb and reinstall the trunk lamp housing in reverse order.

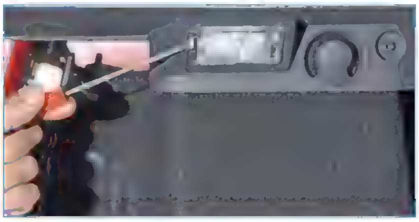
To replace the lamp housing, pull it out of the hole in the rear shelf (see above).

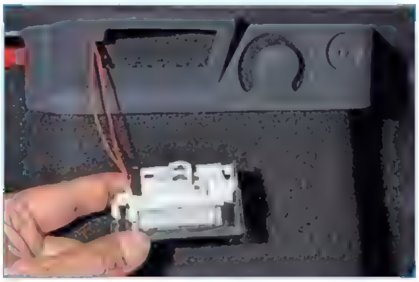

Pressing the wiring connector latch......we disconnect the wire connector from the lamp housing.

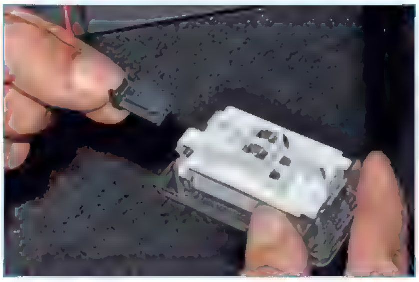
Install the trunk light housing in the reverse order.

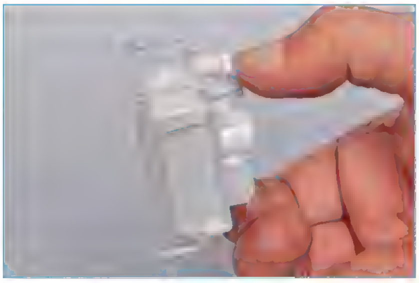
Removing the trunk lamp housing and replacing the bulb on Sandero and Sandero Stepway vehicles

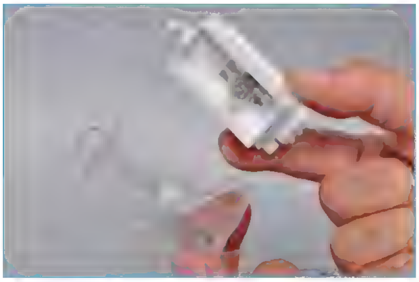
Perform the work when replacing the trunk light bulb or lens. Disconnect the wire terminal from the battery's negative post. Open the trunk lid...

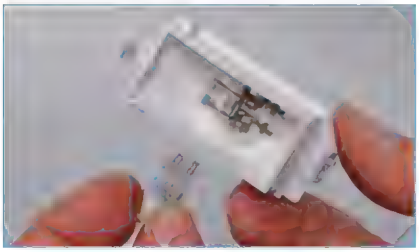

...use a screwdriver to pry off the lens...


...and pull it out of the trunk trim.


Press the latch and disconnect the wire connector from the lamp socket.


Press the diffuser latch...

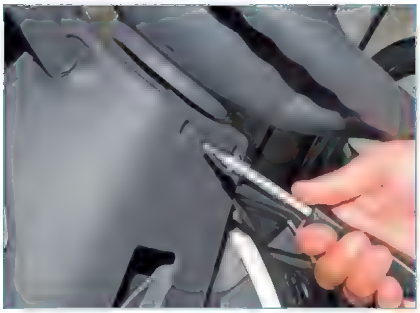

...and remove the lamp diffuser.


Remove the bulb from the lampshade. Install the new W5W bulb in the reverse order.

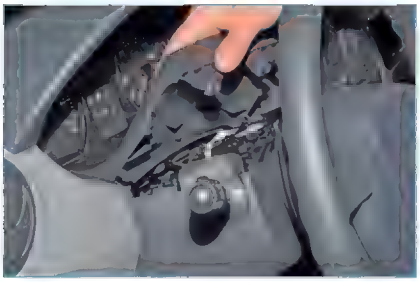
Removal of the steering column switches and the switch connector from the spiral cable drum mechanism

Perform this work when replacing the steering column switches, the switch connector with the drum mechanism, and also when removing the steering column and the instrument panel. Disconnect the wire terminal from the negative terminal of the battery.

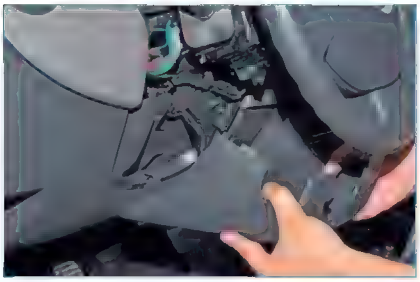
To remove the steering column switches...



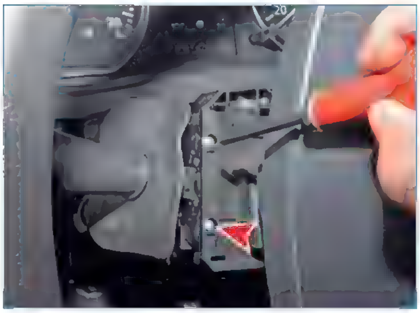
...use a Torx T-20 wrench to unscrew the two self-tapping screws securing the steering column covers.



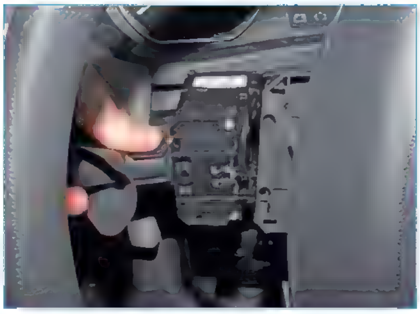
Remove the upper steering column cover, overcoming the resistance of the four retainers.



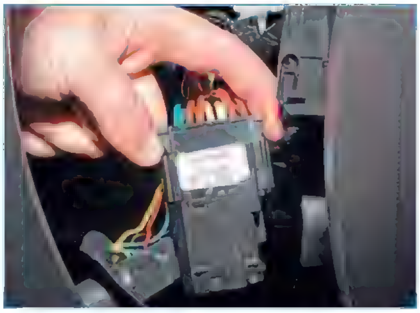
Remove the lower steering column cover.



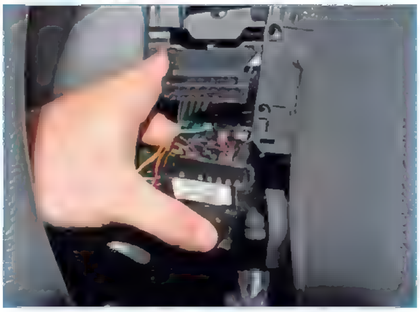
Use a Phillips screwdriver to unscrew the two self-tapping screws securing the left steering column switch.



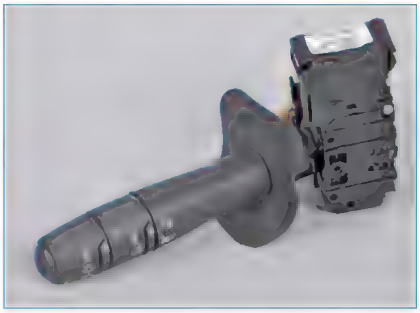
Pull the left switch out of the connector.



Squeeze the two housing latches...

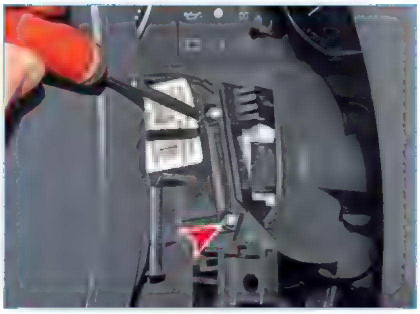


...disconnect the wire plug from the switch connector...



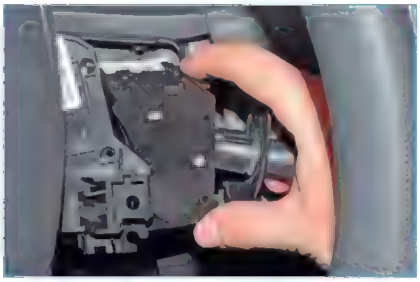
...and remove the left steering-column switch.

To remove the right steering-column switch, remove the immobilizer coil (see “ Replacing the immobilizer coil and ignition switch,” p. 247).

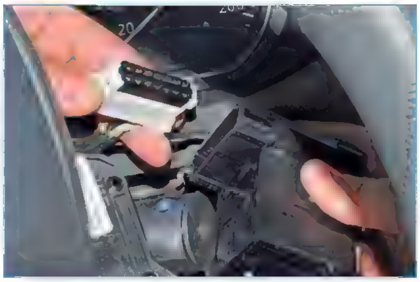


Using a Phillips screwdriver, unscrew—

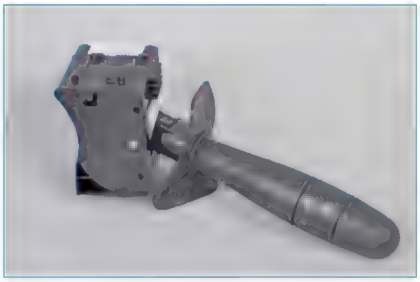
Unscrew the two self-tapping screws securing the right steering-column switch.



Pull the switch out of the connector.



Squeezing the two pad retainers, disconnect the wire pad from the switch connector...



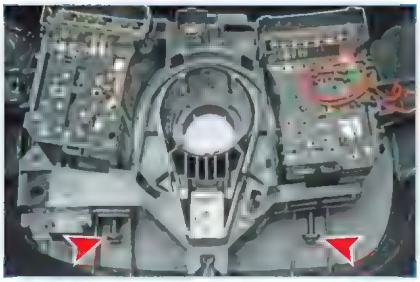
...and remove the right steering-column switch

switcheroo

Install the steering-column switches in reverse order.

sequence.

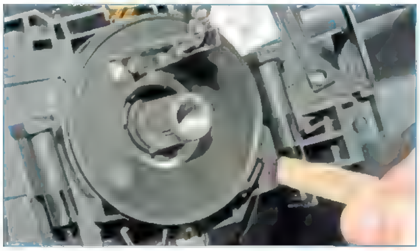
When installing the steering column covers...



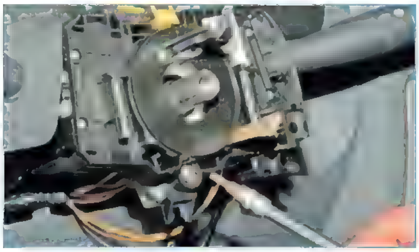
...the screws securing the covers are passed through the holes in the bosses of the steering column switch connector housing (for clarity shown on the removed covers and the steering column switch connector). To remove the switch connector with the drum mechanism, position the front wheels so they point straight ahead. Remove the steering wheel (see “ Removing the steering wheel”, p. 215).

Remove the steering column covers as shown above.

Before removing the connector from the steering column (to make reassembly easier), it is best to lock the device drum to prevent it from turning. To do this, if necessary, rotate the drum slightly so that the recess between the two drum lugs aligns with the housing slot...



...and insert a wooden wedge.



Using a Torx T-20 wrench, loosen the connector mounting screw by a few turns.

Pressing on the screw head along its

of the
shaft...

...slide the connector away from the steering

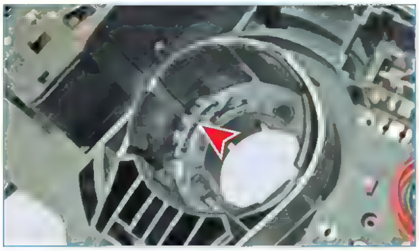
column.

Disconnecting the plug of the wires
OT for the steering-column switches of the switches
(see above) and remove the connector from the assembled switches.

Install the connector to the bar-

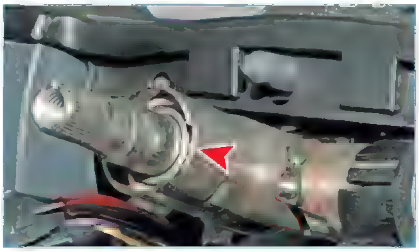
mounted unit and the steering-column switches in the reverse order.

When installing the connector, align...



...the projection in the housing socket with the connec-

calf...



...with a slot on the end of the steering column tube.

Removing the horns

Perform the work when replacing the horns.

Depending on the equipment level, one or two horns may be installed on the vehicle.

The horns are located behind the front bumper.

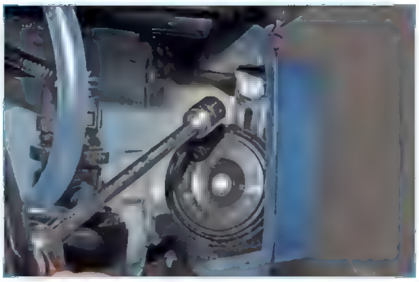
If only one horn is fitted (high tone), it is located on the right side; if two horns are fitted, the high-tone horn is on the right and the low-tone on the left. The removal of the high-tone horn is shown; the low-tone horn is removed in the same way.

Perform the work in a service pit or on a ramp.

Disconnect the cable terminal from the battery's negative terminal.

Remove the right front wheel well liner (see “Removing the front splash guards and wheel well liners,” p. 284).

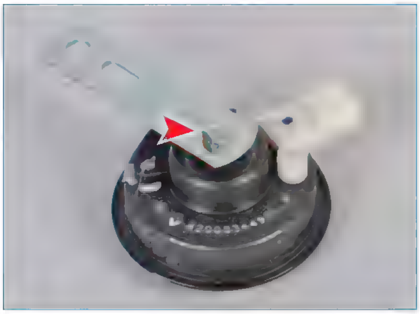
Pressing the spring clip, disconnect the wire connector from the horn socket (the front bumper has been removed for clarity).



Use a 13 mm socket to loosen the bolt...

...and remove the horn with its bracket.

To remove the bracket...



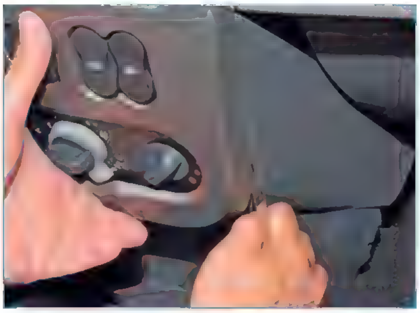
...use a wrench or a 13 mm socket to loosen the nut.

Install the high-pitched horn in the reverse order of removal.

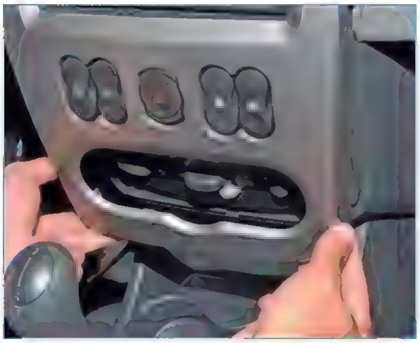
sequence.

Removing the switches

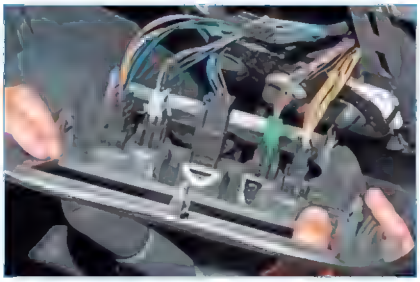
We perform the work when replacing switches. The switches on the console trim of the instrument panel are also removed when replacing the trim. To remove the **switches on the instrument panel console...**



...pry up the console trim with a knife...

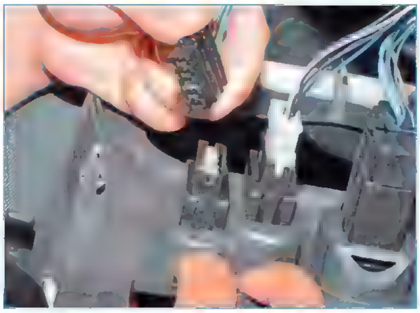


...pull the trim away from the console, overcoming the resistance of the retainers...

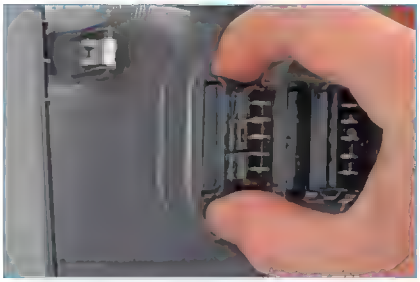


...and remove the trim.

Before disconnecting the wiring plugs from the switches, mark them with a marker.



Disconnect the wiring plugs from the switches.

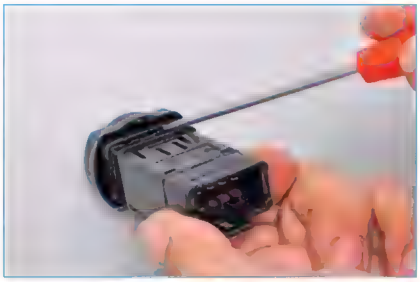


Squeezing the two latches, we pull the swi-tch out of the cover opening...

...and remove the switch from the cover.

We remove the other swi-tches in the same way.

To replace the lamp in the hazard warning switch...



...pry the button out with a screwdriver—of the switch...

...and remove it.

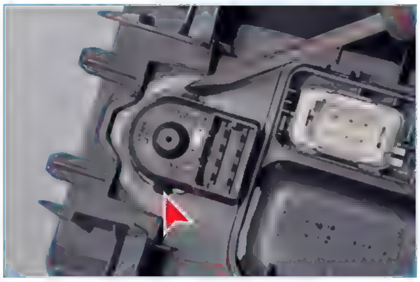
Pull the bulb out of the switch...

...and replace it with a new bulb W1,2W.

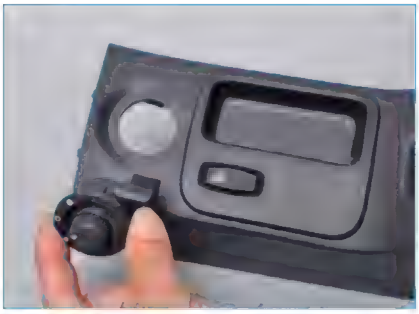
Install the switches on the con-reinstall the dashboard panels in reverse order.

To remove the **switches on the floor tunnel**, remove the rear part of the floor tunnel trim (see "Removing the floor tunnel trim", p. 303).

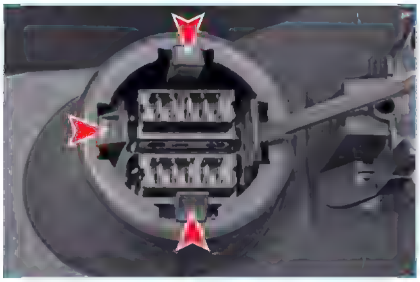
"Removing the floor tunnel trim", p. 303).



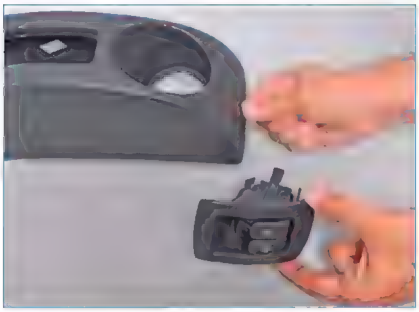
Using a screwdriver, press the two clips alternately...



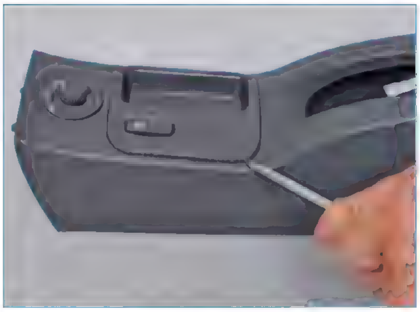
...and remove the control for the exterior mirror power drive.



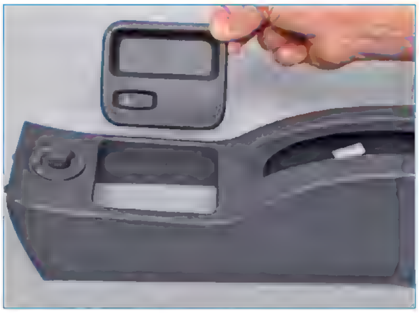
Using a screwdriver, press the four clips in turn...



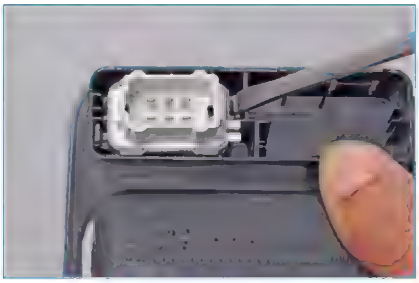
...and remove the rear door power window switch module. The rear window lock switch can be removed without removing the floor tunnel trim (the procedure is shown on a removed trim for clarity).



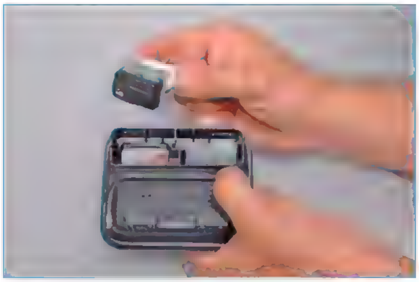
Pry up the tunnel trim insert with a screwdriver...



...and remove the insert with the lock switch.
If the work is being carried out on the vehicle, disconnect the wiring connector from the switch.

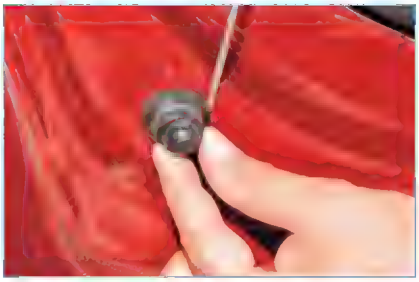


Press the latch with a screwdriver...

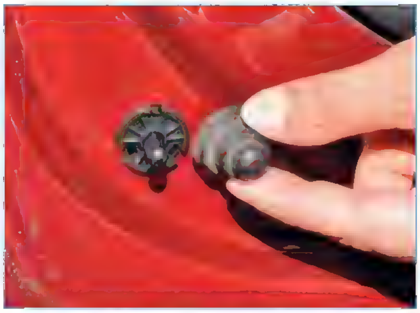


...and pull out the interlock switch.
Install the switches on the floor tunnel trim in reverse order.

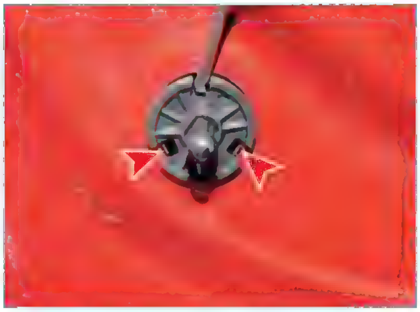
To remove **the door limit switch...**



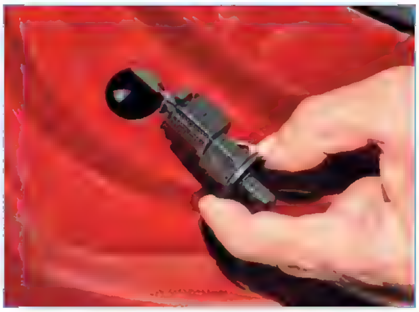
...pry up the protective cap with a screwdriver...



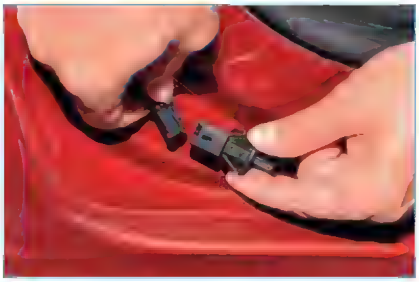
...and remove it from the switch.



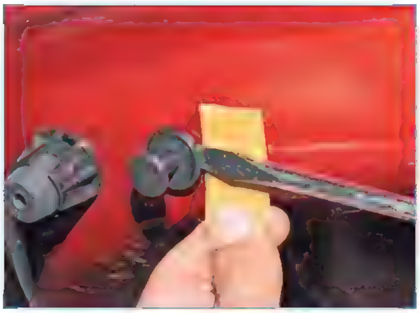
Press the three clips in turn...



...and pull the switch out of the body opening.

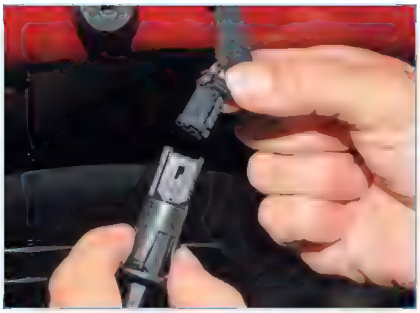


Press the retainer and disconnect the wiring plug from the switch.
Install the switch in reverse order. On Sandero and Sandero Stepway vehicles, to remove the **luggage compartment light switch...**



...pry up with a screwdriver (placing a cardboard plate underneath) the switch...

...and pull it out of the trunk lid hole.

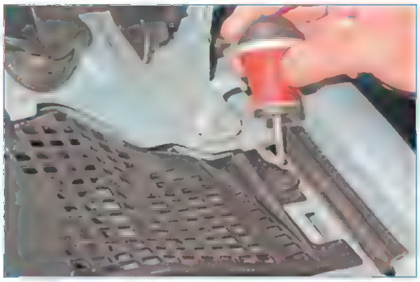


Pressing the latch, disconnect the wire connector from the switch. Install the switch in the reverse order.

Removing the windshield wiper motor gear

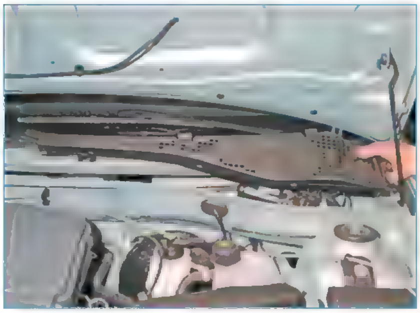
Work is performed when replacing the windshield wiper motor-reducer.
Disconnect the wire terminal fro m the negative terminal of the battery.

Remove the seal from the front bulkhead partition.

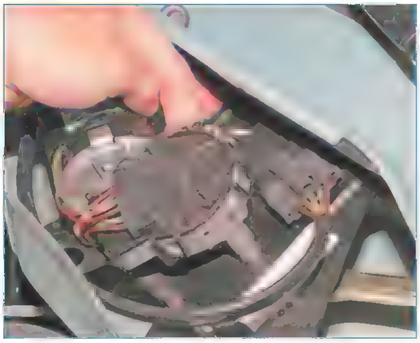


Pry the pin of the piston fastener for the left trim with a screwdriver...

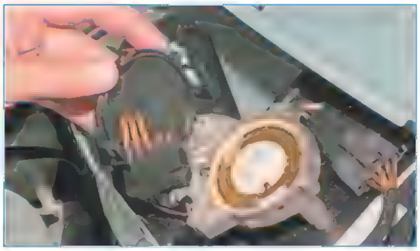
...and remove the piston.



Remove the left trim.
If there are malfunctions in the purifier related to the condition of the end switch contacts...

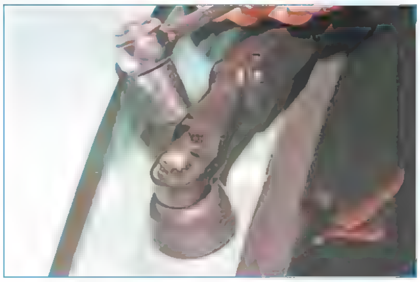


...by releasing the clips of the gear motor cover...



...remove the cover.
If necessary, clean and sand and ... bend the contacts of the end switch.
Before removing the wiper motor-reducer, mark the position of the wiper blade on the windshield with a marker.

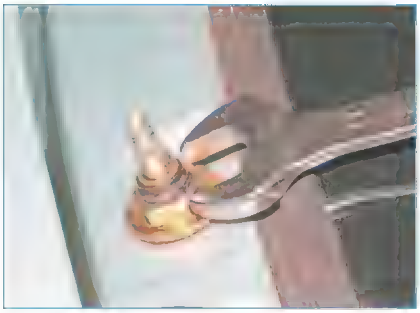
Pry off the decorative cap c overing the nut that secures the wiper arm using a screwdriver.



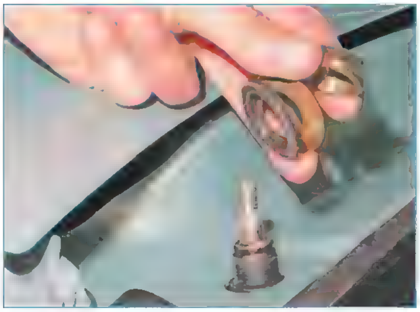
Use a 13 mm socket to loosen the nut securing the wiper arm.

Remove the arm with the blade from the motor-reducer shaft.

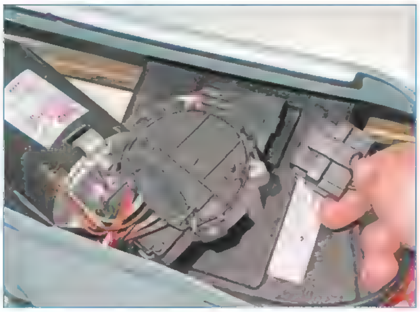
Remove the decorative cap from the shaft.



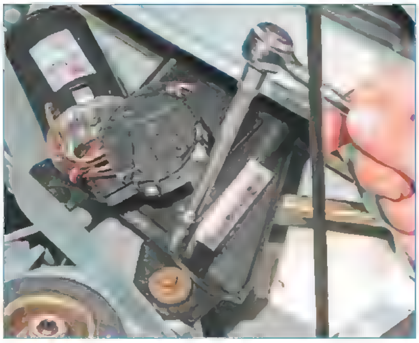
Using a 24mm wrench, loosen the nut...



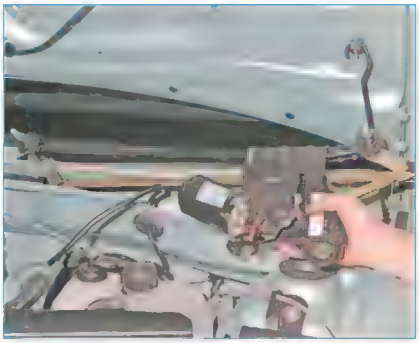
...and remove the nut, washer, and seal from the gearmotor shaft. Perform the same operations on the other wiper shaft. Pressing the retainer...



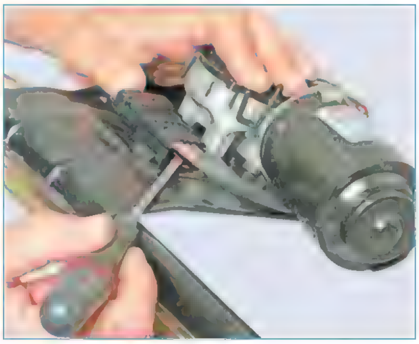
...disconnect the wiring harness connector from the gearmotor wire connector.



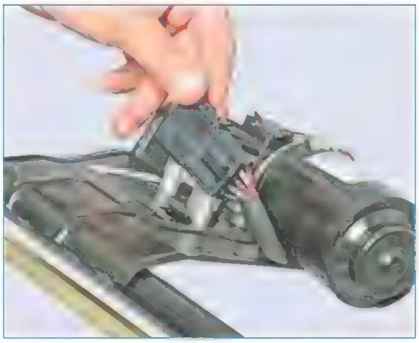
Use a 10mm socket to loosen the bolt securing the wiper bracket.



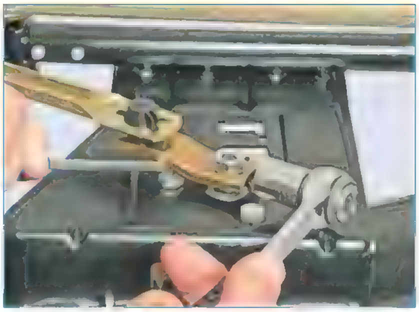
Remove the windshield wiper assembly.



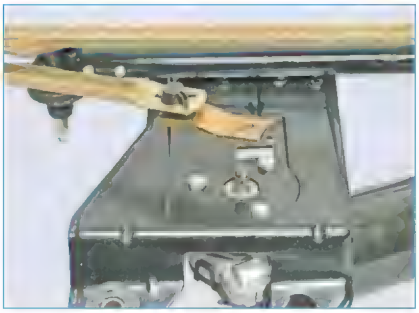
Prying the wire connector latch with a screwdriver...



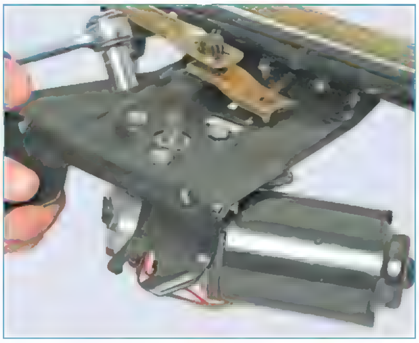
...pull the wire connector out of the guide bracket.



Using a 13 mm socket, loosen the nut securing the crank, holding the crank with a screwdriver.



Remove the crank from the motor-gearbox shaft.



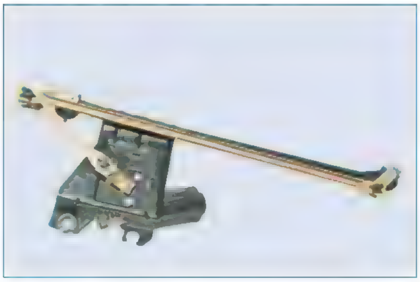
Using a 10 mm socket, loosen the three bolts securing the motor-gearbox to the wiper bracket...

...and remove the motor-gearbox. Install the motor-gearbox on the wiper bracket in reverse order.

To return the windshield wiper motor-reducer shaft to its original position, place the wire clamp on the battery's negative terminal. Then connect the wiring harness plug in the engine compartment to the wiper motor-reducer and activate it using the right steering-column switch. Turn off the wiper and wait for the motor-reducer shaft to stop.

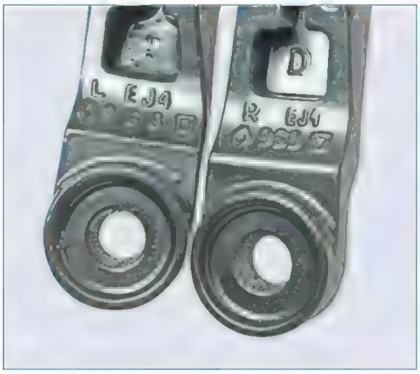
Disconnect the wiring harness connector in the engine compartment from the wiper motor gearbox.

In this position of the motor-gearbox shaft, install the wiper crank so...



...as shown in the photo.
Tighten the crank retaining nut.

When installing the wiper arms on the wiper shafts, pay attention to their markings...

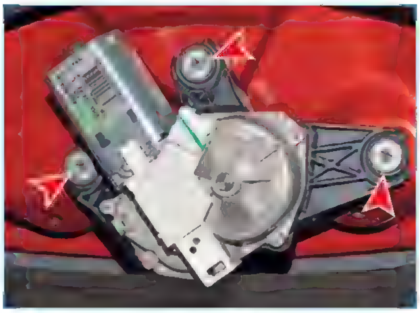


...on the right lever – the letter «R», on the left – «L».
Reinstall the windshield wiper in the reverse order.

Removing the tailgate window wiper on Sandero and Sandero Stepway vehicles

Work is carried out when replacing the tailgate window wiper motor-reducer.

Tailgate window wiper...



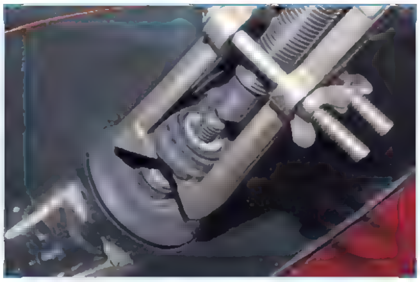
...is fastened to the inner panel of the door with three special rivets.
Therefore, we recommend going to a service station to replace the motor-reducer.
To remove the washer, remove the trim of the luggage compartment door (see " Removing the luggage compartment door lock on Sandero and Sandero Stepway vehicles", p. 303).

Disconnect the wire terminal from the negative terminal of the battery.

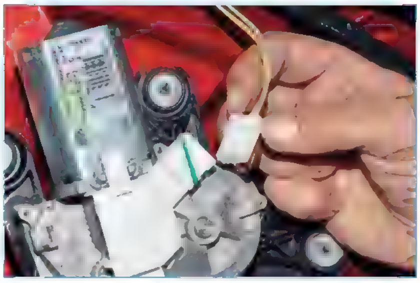
Lift the protective cap covering the nut securing the wiper arm.

Use a 13 mm wrench to loosen the retaining nut of the arm...

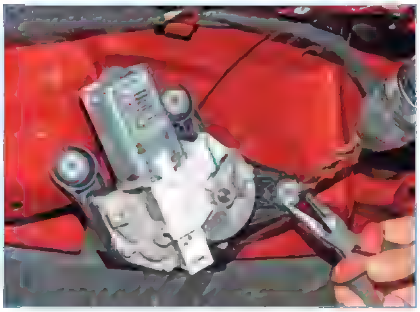
...and remove the arm with the blade. If the arm cannot be removed from the wiper splined shaft...



...press it off using a puller.



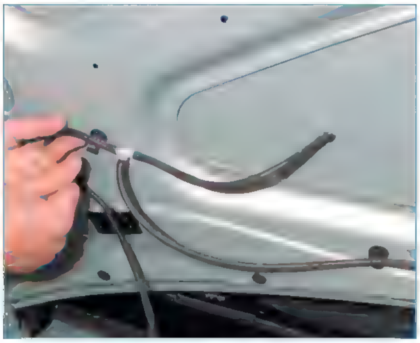
Pressing the retainer, disconnect the wire plug from the motor-reducer connector.



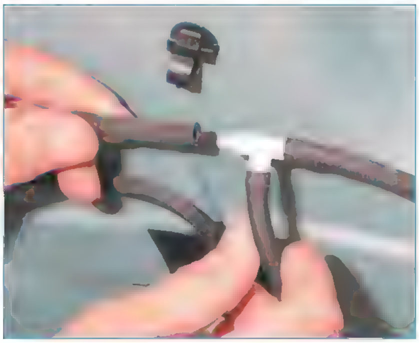
Drill out the three rivets securing the wiper...
...and remove the wiper. Install the rear hatch glass wiper in the reverse order. Use new rivets to secure the wiper.

Removing the Windshield Washer Pump

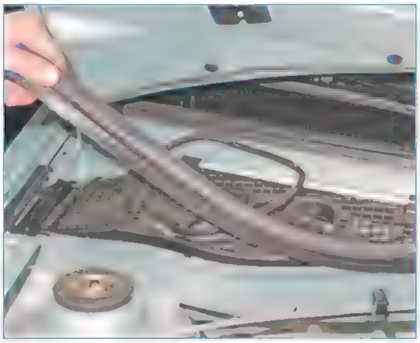
Perform this procedure when replacing the washer pump and reservoir. With the hood open...



...route the washer hose out of the retainers on the hood...

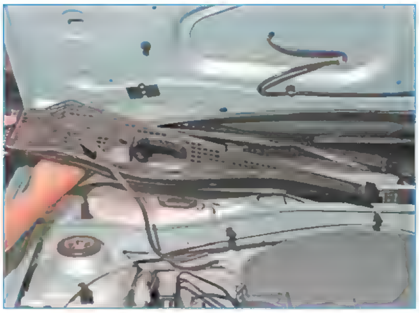


...and disconnect it from the tee.

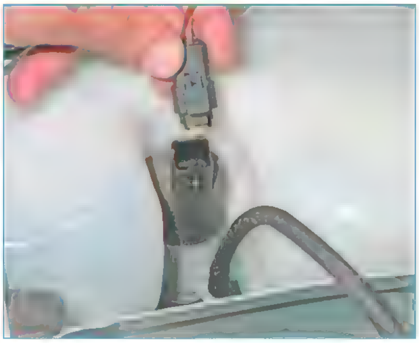


Remove the seal from the front panel partition.
Prying up the piston pin with a screwdriver, remove the piston that secures the right trim (see “Removing the windshield wiper motor-reducer” on p. 272 for details).

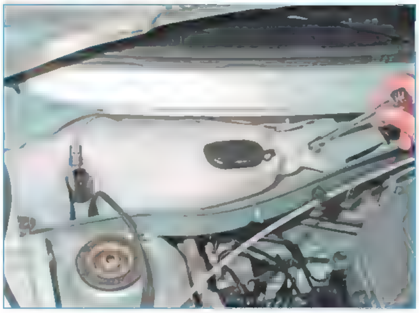
Remove the washer hose from the holder of the right trim...



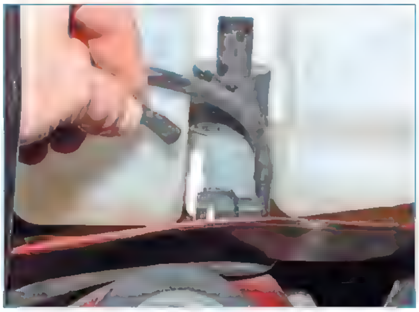
...and remove the trim, passing the washer hose through its hole.



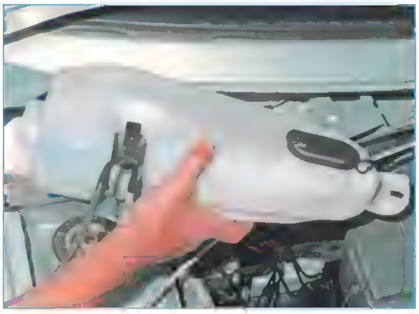
Pressing the retainer, disconnect the wire connector from the washer pump.



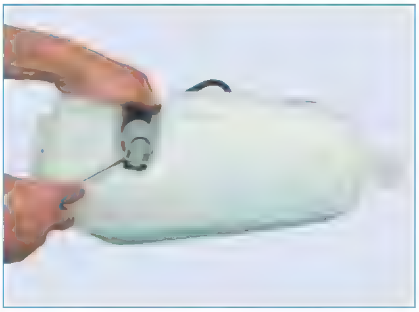
Use a 10 mm socket to unscrew the washer reservoir mounting bolt.
On Sandero and Sandero Stepway vehicles, after raising the reservoir...



...disconnect the hose that supplies fluid to the rear hatch window from the pump fitting.

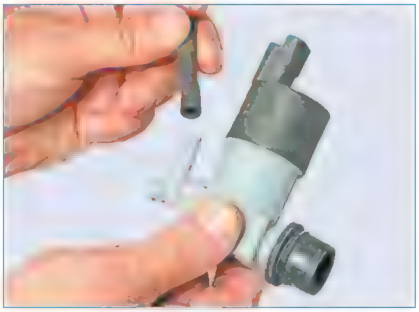


Remove the washer reservoir with the pump assembly.

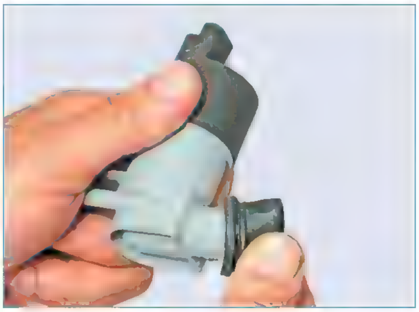


Prying the pump with a screwdriver...

...pull it out of the reservoir.

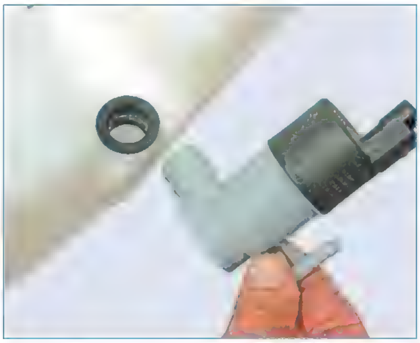


Remove the windshield washer fluid supply hose from the pump fitting.



Remove the sealing sleeve from the pump outlet.
If the sleeve is torn, cracked, or has lost its elasticity, replace it with a new one.

Insert the sealing bushing into the reservoir hole.
Before installing the pump, wet its nozzle with soapy solution...

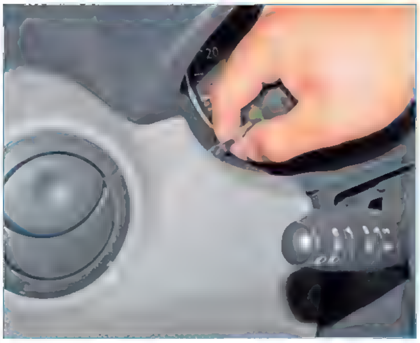


...and insert it into the bushing hole. Install the windshield washer reservoir in reverse order.

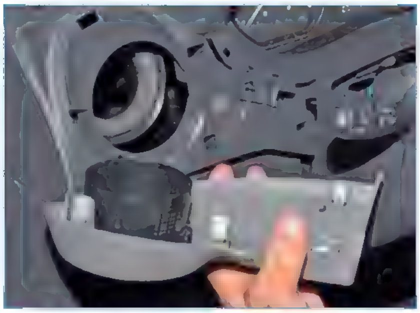
Removing the instrument cluster

Perform this work when replacing the instrument cluster, as well as when removing the dashboard and steering column. Disconnect the wire terminal from the negative terminal of the battery.

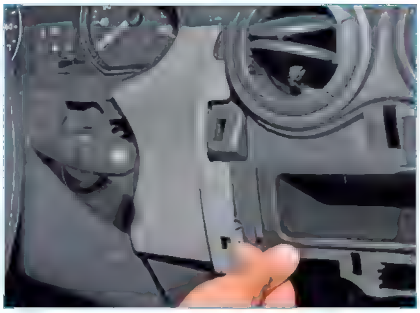
Remove the upper steering column shroud (see “Removal of the steering column switches and the switch connector with the spiral cable drum assembly,” p. 267). Remove the instrument panel console trim (see “Removal of switches,” p. 270).



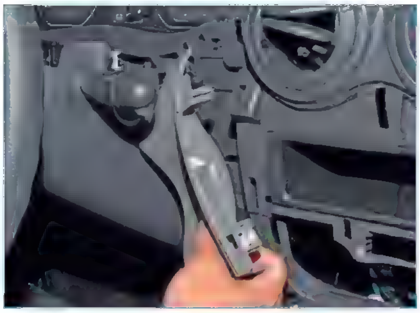
Pry up the left decorative trim of the instrument panel with a screwdriver...



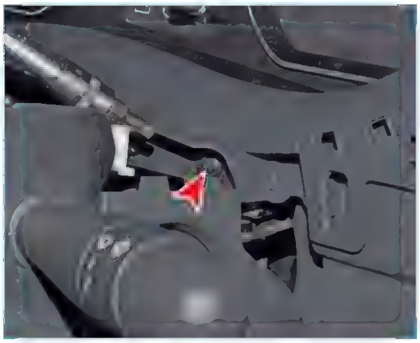
...and remove it, overcoming the resistance of the clips.



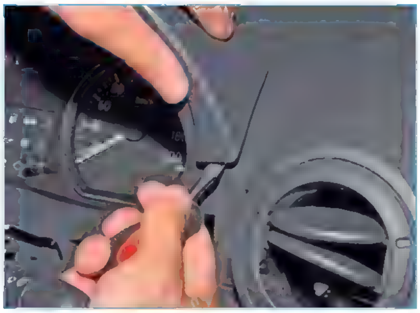
Pry up the right trim with your finger—decorative trim of the instrument panel...



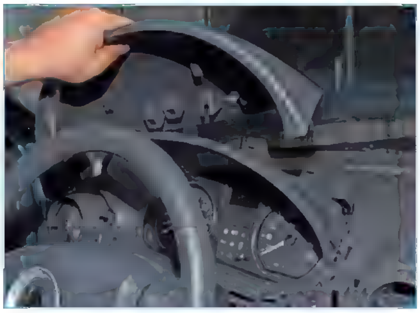
...and remove it, overcoming the resistance of the clips.



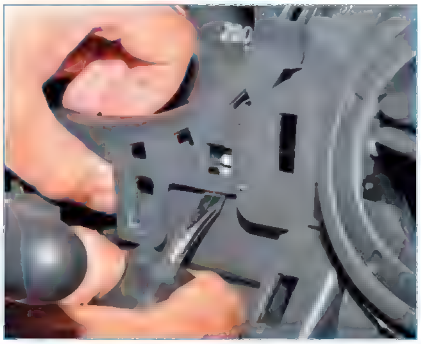
Using a Torx T-20 bit, unscrew the mounting screw of the instrument cluster trim on the right side. Similarly, unscrew the mounting screw of the trim on the left side.



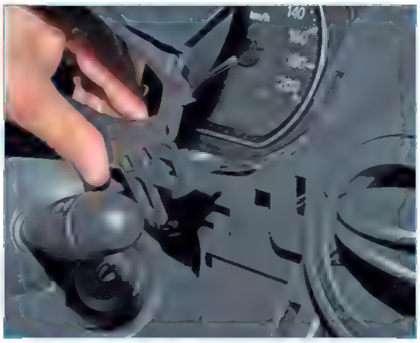
Pry up the instrument cluster visor with a screwdriver...



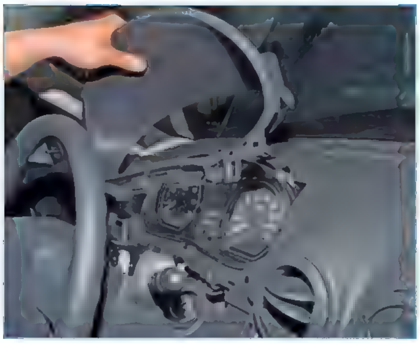
...and remove the visor, overcoming resistance of the retainers.



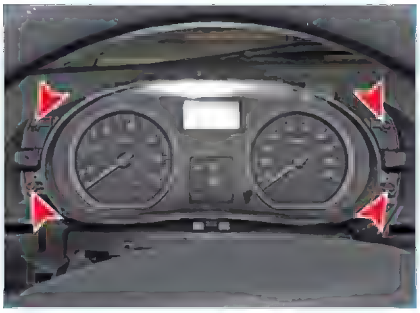
Pry up the edge of the instrument cluster trim with a screwdriver...



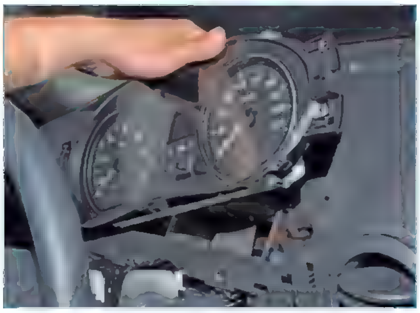
...and disengage the right-side retainer of the trim. Similarly, disengage the retainer of the trim on the left side.



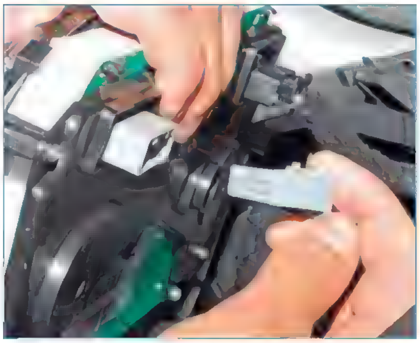
Remove the instrument cluster trim.



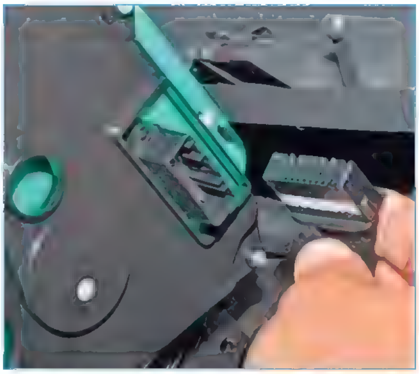
Using a Torx T-20 wrench, unscrew the four self-tapping screws securing the instrument cluster.



Carefully pull the instrument cluster out of the dashboard...



...and, by pressing the latch, disconnect the gray wiring connector from it.



Similarly, disconnect the connector black wires...

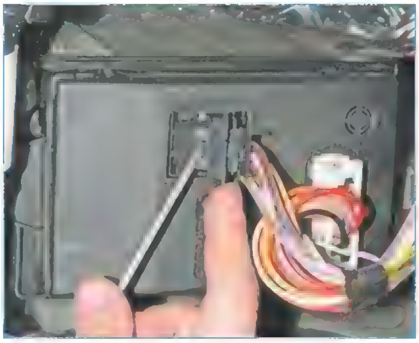
...and remove the instrument cluster.

LED indicators installed in the instrument cluster are soldered to the board and cannot be replaced. If an indicator, gauge, or display fails, replace the entire instrument cluster with a new one.

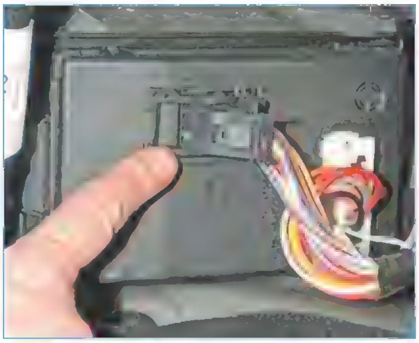
Install the instrument cluster in the reverse order.

Removing the junction block

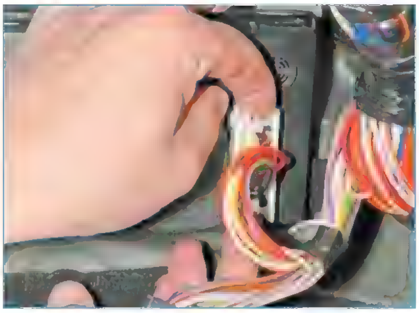
Perform this work when replacing the junction block located under the instrument panel on the left. Disconnect the cable terminal from the battery's negative terminal. For clarity of the operation, we show this with the instrument panel removed.



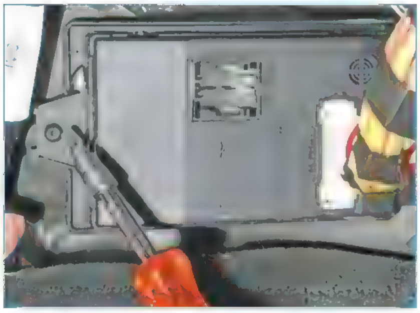
Press the latch on the wiring harness connector...



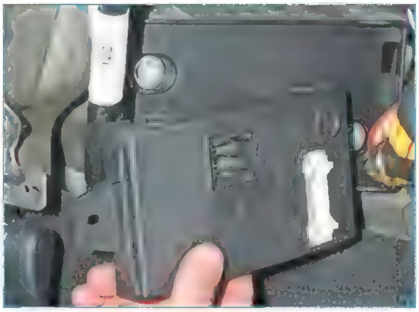
...and rotate the retaining clip to disconnect the wiring harness connector from the module.



Squeezing the latches......disconnect the other wiring harness connector from the module.



Use a Torx T-20 wrench to loosen the module mounting screw...

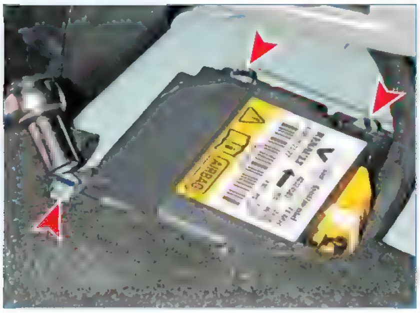


...and remove the junction module. Install the junction module in the reverse order.

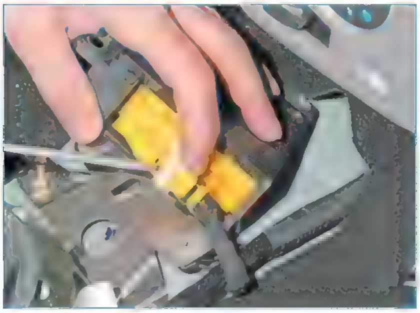
Removing the airbag control unit

This work is carried out when replacing the airbag control unit.

Disconnect the wire terminal from the negative terminal of the battery. Remove the floor tunnel trim (see “Removing the floor tunnel trim”, p. 303).
Fold back the carpet covering on the floor tunnel.



Use a 10 mm socket to loosen the three bolts securing the airbag control unit.

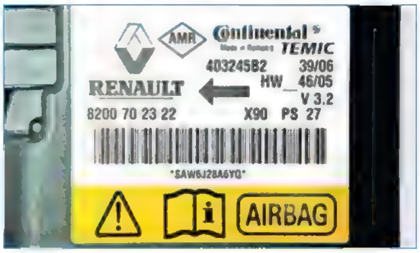


Pressing the retainer with a screwdriver...

...and turning the locking clip of the wiring harness connector...

...we disconnect the connector from the unit...

...and remove the airbag control unit.



Airbag control unit labeling

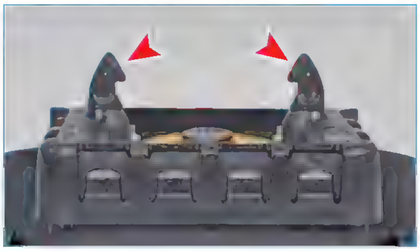
Install the airbag control unit in reverse order.

Driver airbag removal

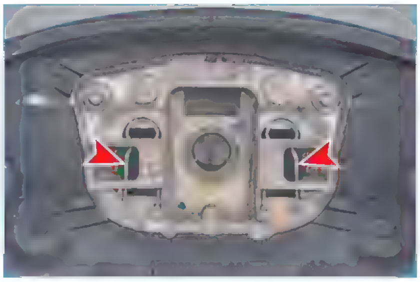
This work is performed when removing the steering wheel and replacing the driver's airbag.

Before removing the airbag, for safety disconnect the battery cable from the negative terminal of the battery. After that, wait at least 10 minutes to allow the airbag activator capacitor to discharge.

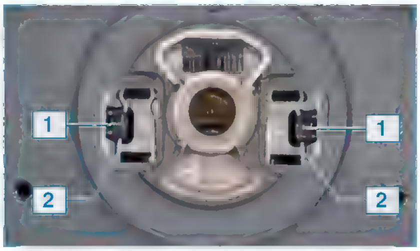
The airbag is secured on the steering wheel...



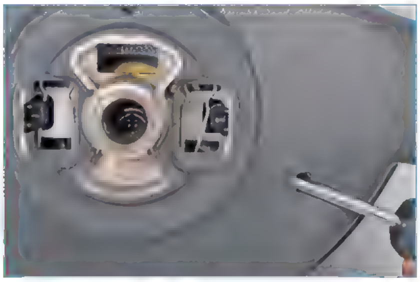
...by two plastic hooks that engage...



...with two spring retainers on the steering wheel (shown for clarity with the airbag removed).

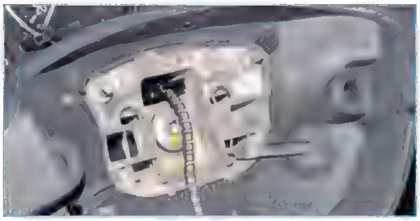


View of the steering wheel with the assembled airbag (from the instrument panel side): 1 – airbag hooks; 2 – spring фиксаторы рулевого колеса To remove the airbag from the back of the steering wheel...



...we insert a screwdriver into the steering wheel hole (for clarity

shown on the removed steering wheel)...

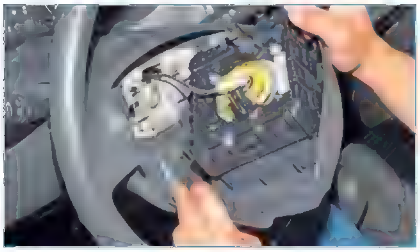


...press out the spring retainer with a screwdriver (shown with the airbag removed for clarity)...

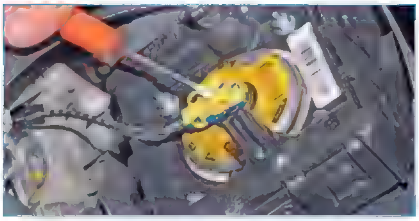
...and, pulling the airbag towards you, disengage the airbag hook from the retainer.

Similarly, disengage the second airbag hook from the retainer.

Set the steering wheel to the straight-ahead position for the vehicle.

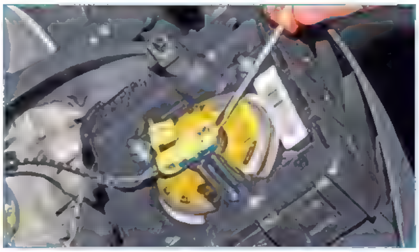


Pull the airbag away from the steering wheel.

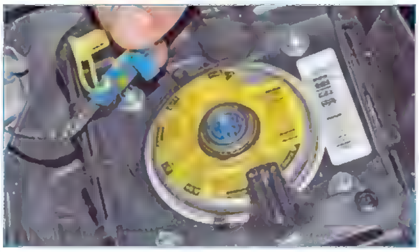


Pry up the connector housing latch with a screwdriver...

...and lift the retainer.

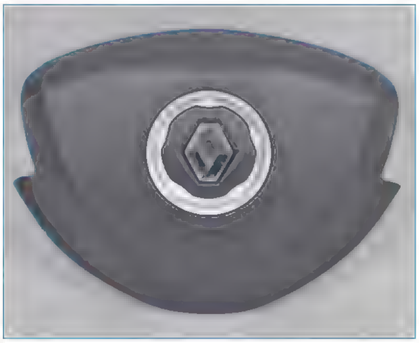


Prying the connector with a screwdriver...



...disconnect the connector from the airbag plug.

The removed airbag should be stored in a place protected from moisture and excessive heat, placing it...



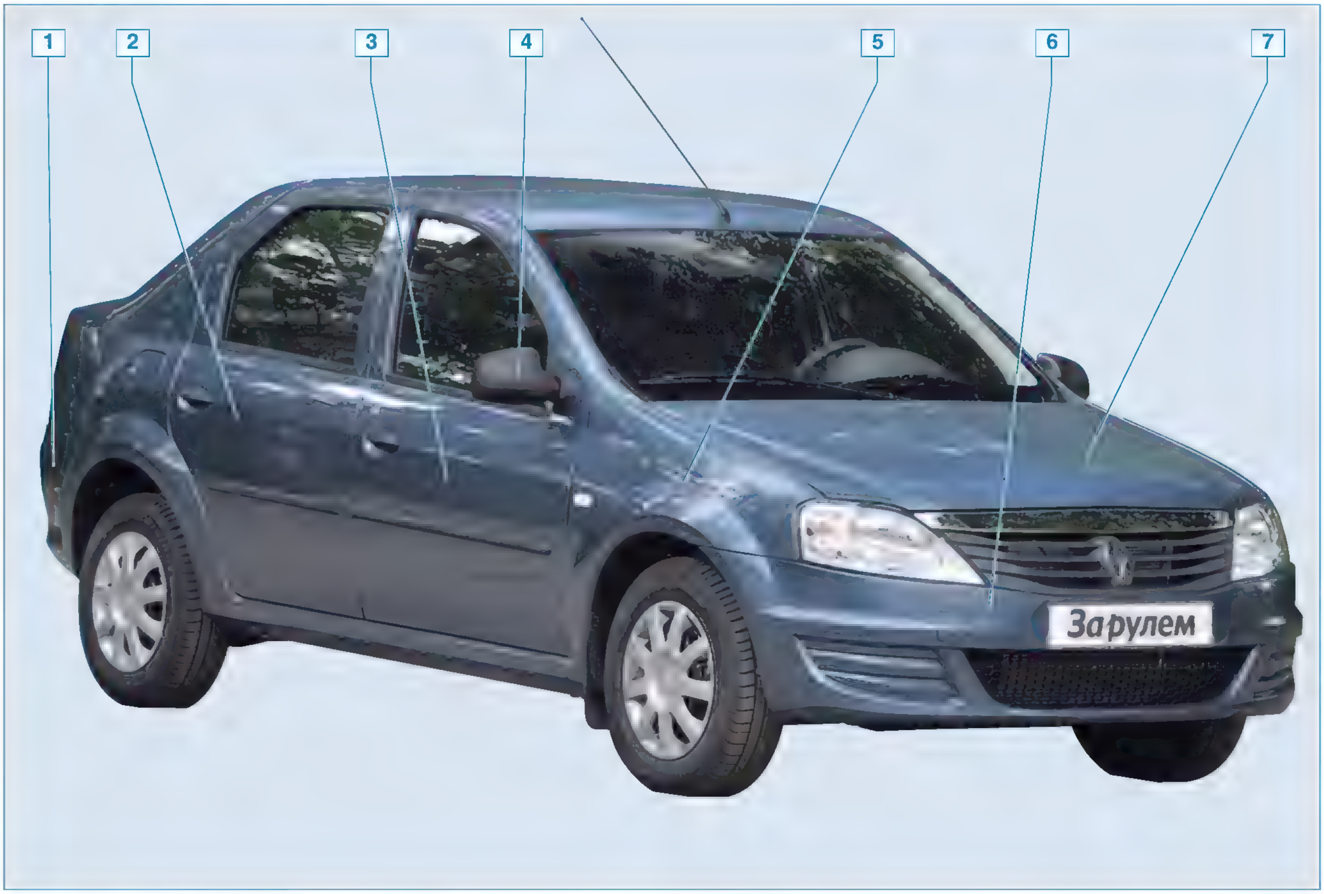
...with the cover facing up.

Do not disassemble or attempt to repair the airbag yourself.

After connecting the wire connector to the airbag plug, insert the r etainer into the connector. Position the driver's airbag on the steering wheel so that the hooks of the airbag engage the corresponding steering wheel openings and pre- ss the pad until it clicks hooks of the pad with the steering wheel retainers.

Body

Description of the construction



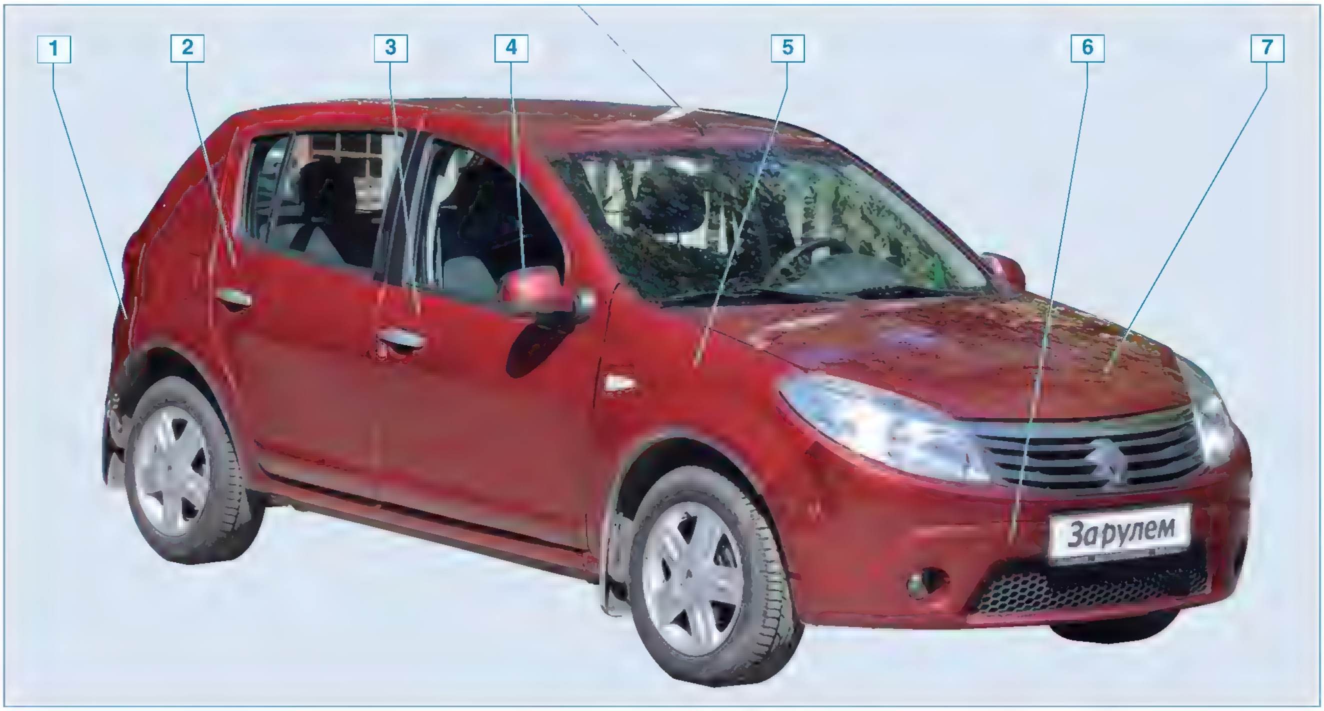
Removable Logan body parts: 1 – rear bumper; **2** – rear door; **3** – front door; **4** – exterior rearview mirror; **5** – front fender; **6** – front bumper with grille; **7** – hood

The bodies of the Logan, Sandero, and Sandero Stepway are load-bearing, all-metal, welded structures. Body components are joined by spot welding, and in hard-to-reach areas by electric welding. Panel seams and welds are sealed with mastic. After welding, the body undergoes cathodic electrophoretic coating by being immersed in a special bath to obtain an anti-corrosion finish. Underbody areas, sills, and wheel arches receive an anti-gravel coating. Then the body is primed and painted. Hidden body cavities are treated at the factory with a wax preservative. Several layers of anti-corrosion mastic are applied to the underside of the body. This anti-corrosion treatment allows the manufacturer to guarantee a period of 6 years before the onset of through corrosion.

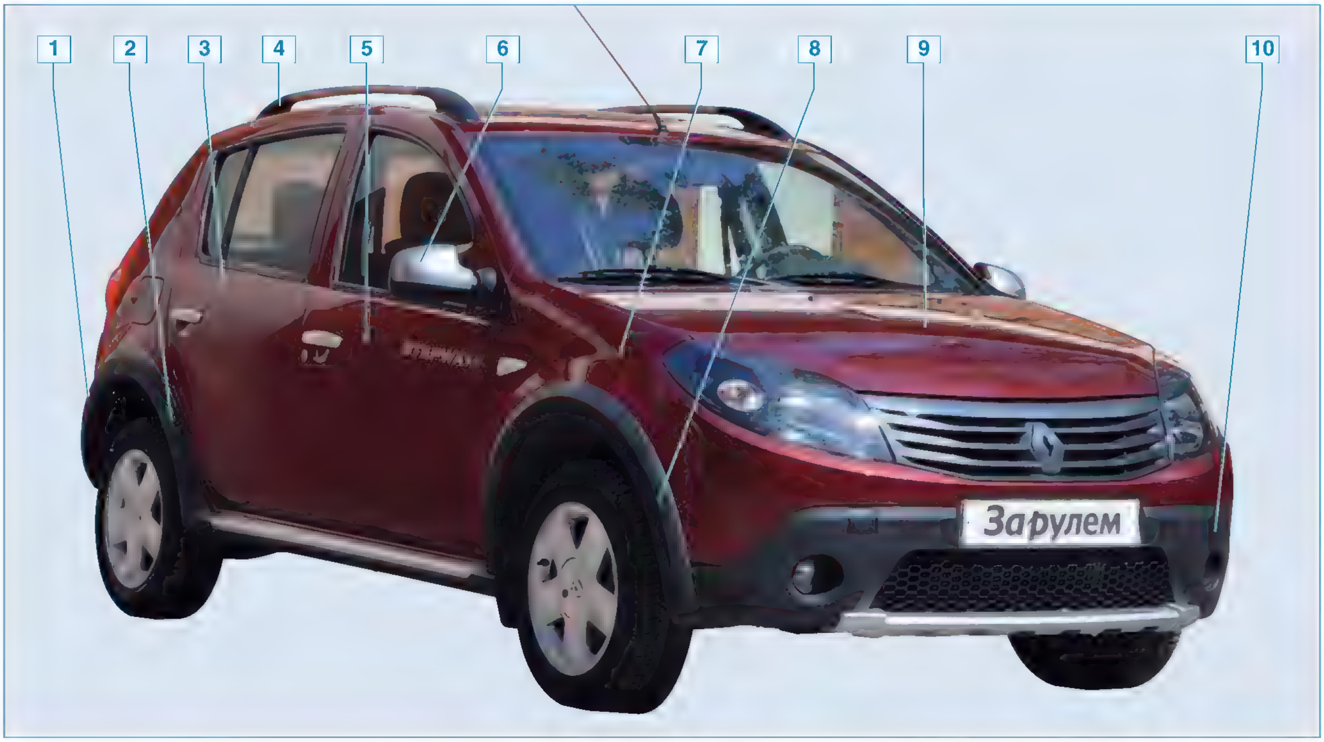
The body structure complies with European standards for passive safety.

In a frontal impact, the cabin is protected by a front load-bearing structural element of the body located in front of the instrument panel. The central pillars of the body absorb the main part of a side impact. In addition, the doors contain safety beams.

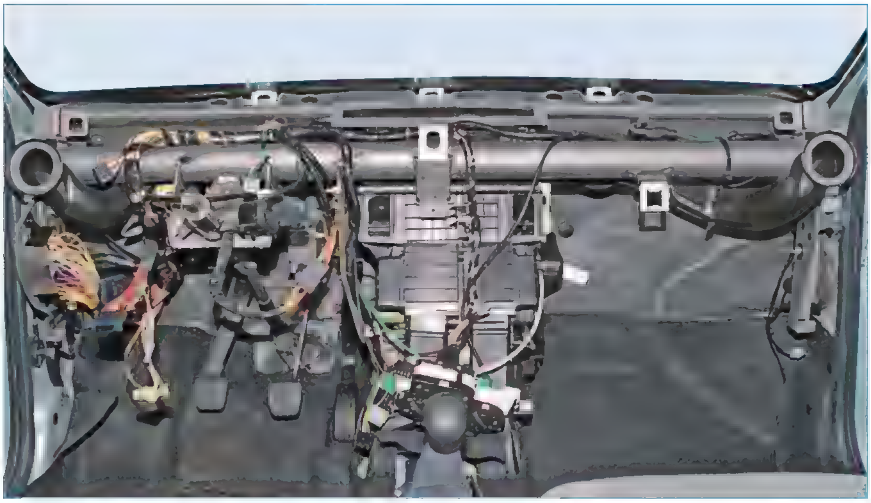
All glass is curved, polished, and of the safety type. The windshield is laminated; the others are tempered. The rear window (Logan) and the trunk lid glass (Sandero, Sandero Stepway) have a heating element. The side door windows are roll-down. Depending



Removable body parts of Sandero: **1** – rear bumper; **2** – tailgate; **3** – front door; **4** – exterior rear-view mirror;**5** – front wing; **6** – front bumper with radiator grille; **7** – bonnet



Removable body parts of Sandero Stepway: **1** – rear bumper; **2** – rear wheel arch trim; **3** – tailgate; **4** – roof rails; **5** – front door; **6** – exterior rear-view mirror; **7** – front wing; **9** – bonnet; **8** – front wheel arch trim;**10** – front bumper with radiator grille



Structural body member – transverse beam (instrument panel removed)

Depending on the vehicle's trim, the door window glasses are operated by mechanical or electric window regulators.

Plastic bumpers are fitted at the front and rear, with the front bumper molded as a single piece with the radiator grille. On some vehicles, front fog lamps are installed in the front bumper. Removable body components include: doors, the trunk lid (Logan), the luggage compartment door (Sandero, Sandero Stepway), the hood, the front fenders, and the bumpers. The front fenders are attached to the body with bolts.

Externally, the Sandero Stepway differs from the Sandero by its decorative sill trims, longitudinal roof rails, and black plastic wheel arch cladding. The Sandero Stepway also has protective inserts in the front and rear bumpers.

The cars are equipped with a central locking system that locks or unlocks all the doors simultaneously. The central lock also secures the trunk lid (Logan) and the tailgate (Sandero, Sandero Stepway).

The cabin features two rows of seats. The front seats are separate, with fore-and-aft adjustment and adjustable seatback recline. Some vehicles are fitted with electrically heated seats, and the driver’s seat has height adjustment. The headrests are removable and height-adjustable. On the Logan, the rear seat is a non-split three-seater; the rear seatback does not fold down. On the Sandero and Sandero Stepway, the rear seat cushion is non-split while the seatback is made up of two sections.

All passenger seats are equipped with three-point seat belts with inertia reel mechanisms. The driver’s and front passenger’s belts have height adjustment. Some vehicles are fitted with inertia seat belts with pretensioners.

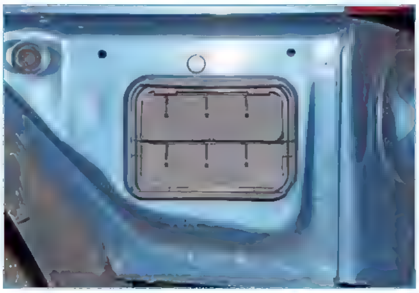
To increase the luggage compartment, on Sandero and Sandero Stepway vehicles you can remove the luggage compartment shelf and fold the backrest sections either separately or together.

The body is equipped with an instrument panel, a glove box, a cigarette lighter, an ashtray, sun visors, internal and external rearview mirrors, and front (removable) and rear towing eyes.

Some vehicles are equipped with exterior mirrors that have electric adjustment and electric heating. The mirror heating operates simultaneously with the rear window defogger.

All vehicles are fitted with a driver's airbag, and some vehicles also have a front passenger airbag. The driver's airbag is installed in the steering wheel, while the passenger airbag is located in the instrument panel on the right side. The cabin is equipped with a heating and ventilation system designed to provide the most comfortable conditions for the driver and passengers regardless of weather conditions. Higher-end trim levels are equipped with air conditioning.

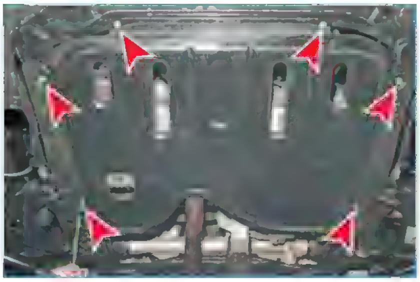
When the vehicle is moving, air is forced into the cabin by dynamic pressure through the inlet openings of the air scoop located under the hood.



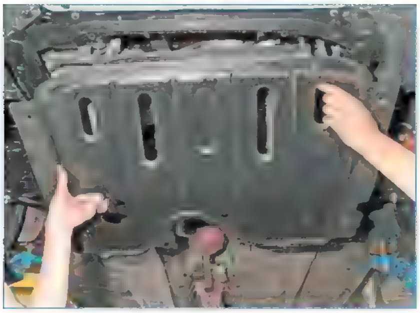
On the Logan vehicle, there are ventilation openings under the rear bumper on both sides, covered by rubber flaps.

Removing the powertrain shield

Perform this work when it is necessary to access engine and transmission components from under the vehicle, and also when removing the subframe. Perform the work over an inspection pit or on a ramp. From underneath the vehicle...



...use a 10 mm socket or wrench to loosen six bolts securing the powertrain shield to the subframe...



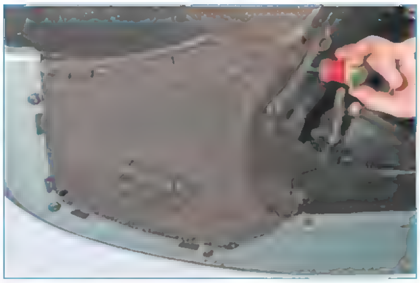
...and remove the shield.
After cleaning off contaminants, install
we removed the protection of the power unit in the reverse order.

Removing the front bumper mudguards

The work is performed when replacing shields, as well as when removing the front bumper, fog lights, subframe, horns, and the adsorber (right shield).

The work is carried out on an inspection pit or an overpass.
The procedures are shown on the left front bumper mud- guard.

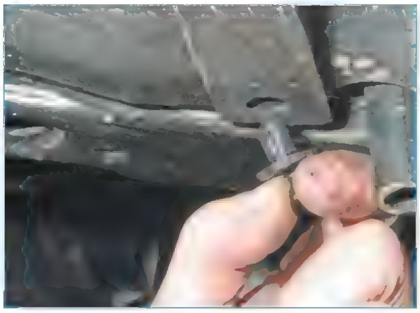
From beneath the vehicle...



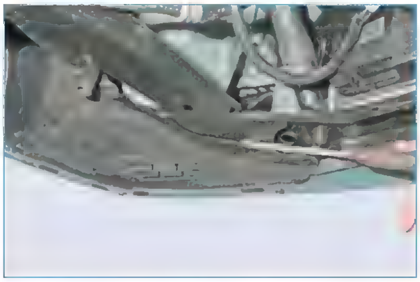
...use a slotted screwdriver to unscrew the

we remove the expanding screw of the piston that secures the

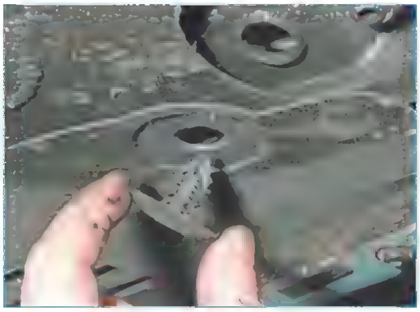
shield to the inner fender.



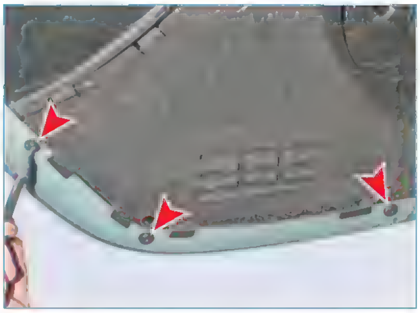
We pull out the piston.



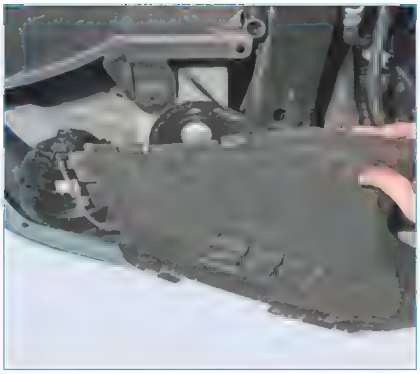
Prying back the edge of the shield with a screwdriver...



...we remove the piston that secures the shield to the subframe.



Using a Torx T-20 wrench, we loosen three self-tapping screws...



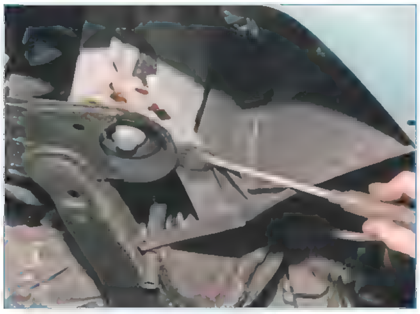
...and remove the front bumper mudguard.
Similarly, remove the right mudguard.
It's best to wash the push rivets and their expansion screws in water before reusing them.
After cleaning off the dirt, install the mudguards in the reverse order.

Removing the engine bay mudguards

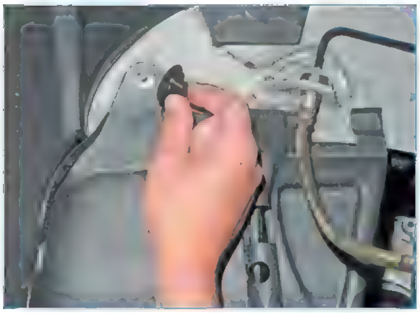
Remove the guards for replacement and also when removing the control arms and front subframe. The right mudguard must be removed when replacing the auxiliary drive belts and timing belt, and when adjusting the valve clearance (1.4–1.6 (8V) engine).

We perform the work on an inspection pit or on a ramp.

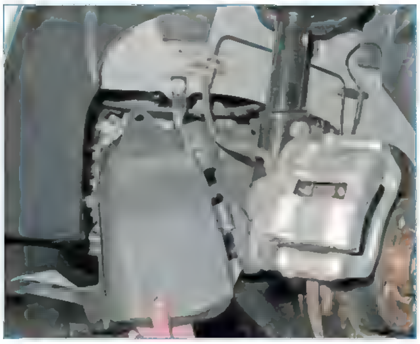
Operations are shown on the left shield of the engine compartment. Remove the wheel. Remove the left mudguard shield of the front bumper (see “Removing the front bumper mudguard shields,” p. 283).



Pry out and pull the lower mounting retainer of the mudguard shield and inner fender out of the body hole using a screwdriver.



Unscrew the upper mounting retainer of the shield.



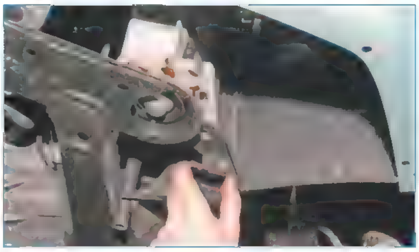
Remove the left mudguard shield of the engine compartment. Similarly, remove the right engine compartment mud shield. Clean the retainers and mud shields. Reinstall the engine compartment mud shields in reverse order.

Removing mudguards and front wheel inner fenders

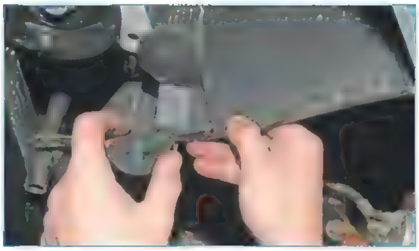
Remove the inner fenders and splash guards for replacement and anti-corrosion treatment of the body.

Perform the work on an inspection pit or ramp.

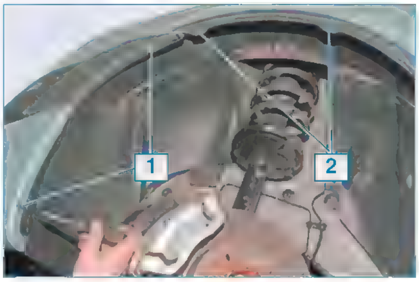
The procedures are shown on the left wheel’s inner fender and mudguard. Remove the wheel and the left front bumper splash shield (see “Removing the front bumper splash shields,” p. 283).



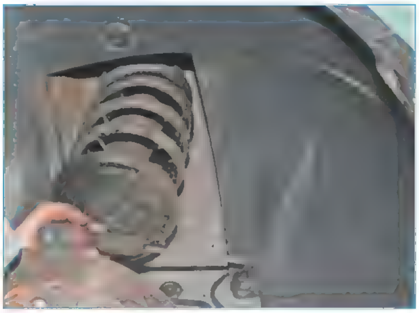
Pry out the piston of the lower mounting for the engine bay splash shield and inner fender from the body hole using a screwdriver.



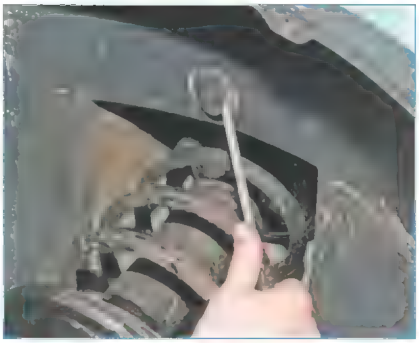
Bending back the edge of the engine compartment splash shield, pull the inner fender out from under it.



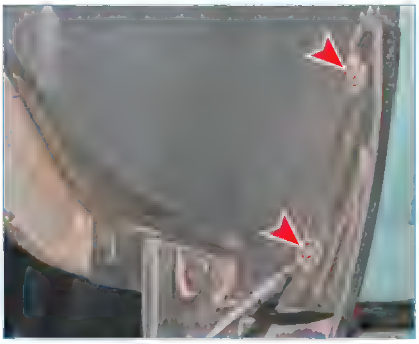
Using a Torx T-20 wrench, unscrew the two long self-tapping screws 1 securing the inner fender to the bumper and the two short self-tapping screws 2 securing it to the fender.



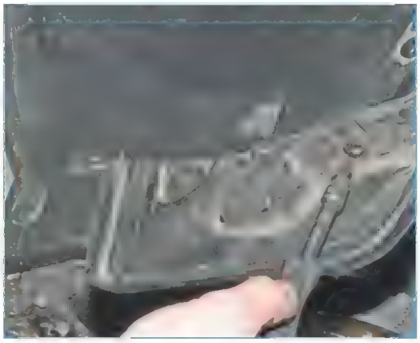
Use a flathead screwdriver to unscrew the piston of the lower inner fender fastener.



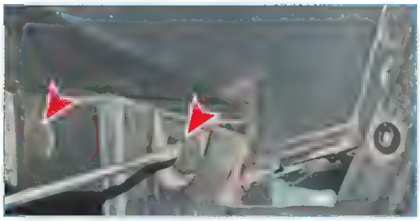
Pry out the piston of the upper inner fender fastener with a screwdriver.



Using a Torx T-20 wrench, unscrew the two screws securing the mudguard.



Using a Torx T-30 wrench, unscrew the screw securing the mudguard.



Using a slotted screwdriver, unscrew the two plastic retainers securing the splash guard and inner fender, then remove the splash guard...

...and the inner fender.

The inner fender and splash guard on the right wheel are removed in the same way.

Install the inner fenders in reverse order.

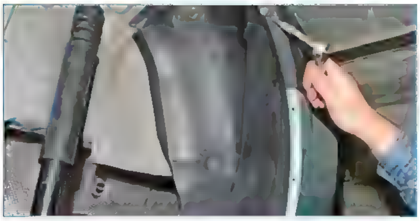
Removal of rear-wheel inner fenders

This work is performed when replacing the inner wing, as well as when removing the rear bumper and performing anticorrosion treatment on the body.

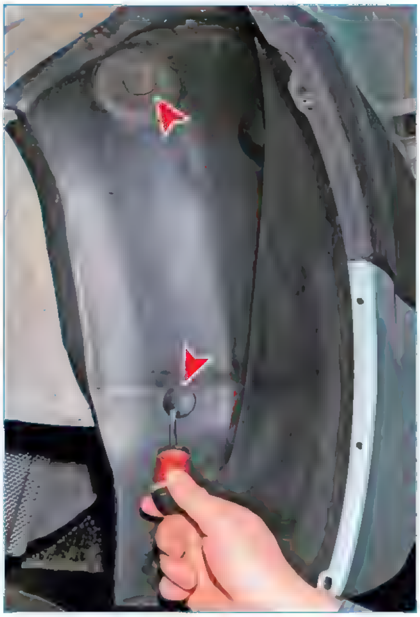
The procedure is shown on a Logan. Removal of the rear wheel arch liners on Sandero and Sandero Stepway vehicles (see "Removing the rear bumper on Sandero and Sandero Stepway vehicles", p. 288).

We demonstrate the steps on the left rear wheel arch liner. Remove the wheel.

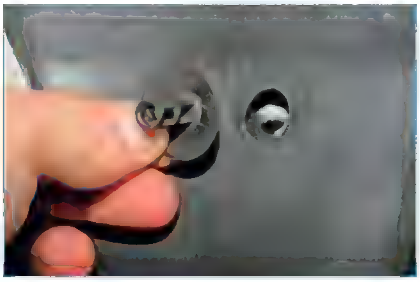
In the wheel arch...



...using a Torx T-20 wrench, unscrew the upper and lower self-tapping screws securing the wheel arch liner.



Use a Phillips screwdriver to unscrew the two plastic nuts securing the inner fender.



The nuts are threaded onto studs welded to the body.

Remove the wheel arch liner.

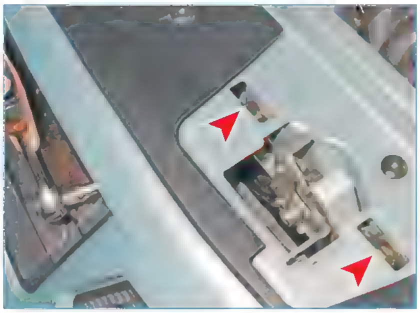
The right wheel arch liner is removed in the same way.

Install the rear wheel arch liners in the reverse order.

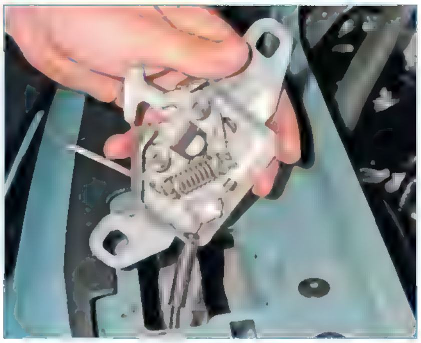
Removing the hood latch and latch cable

Remove the hood latch to replace the spring, the latch cable, or the latch itself. Remove the latch cable to replace it if it is broken or the cable is sticking in its sheath.

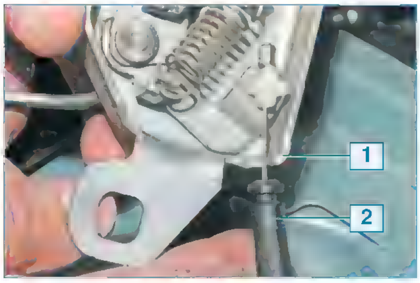
Before removing the latch, mark its position relative to the upper crossmember of the radiator frame with a marker.



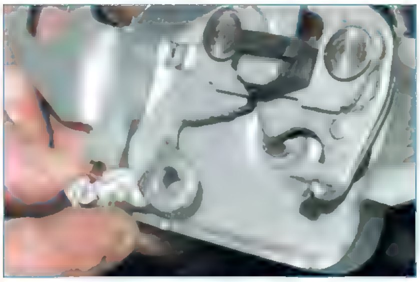
Through the upper openings of the radiator trim, use a 13 mm socket with a universal joint to loosen two nuts securing the latch. Pull the cable out of the two plastic clips.



Removing the lock from the studs of the upper crossmember of the radiator frame, we pull the lock out through the hole in the crossmember.



Remove the tip of the cable sheath 2 from slot 1 in the lock housing. Use pliers to remove the lock spring. Squeezing the petals of the cable retainer...



...pull the retainer with the cable out of the lock lever and remove the lock.

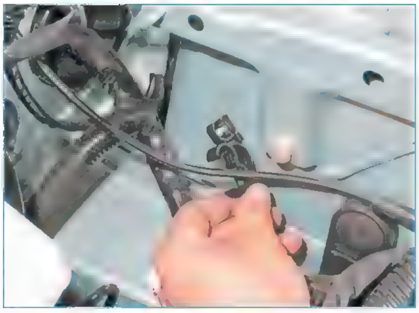
Hood latch

Install the hood latch in the reverse order. When fitting the latch, align it with the marks previously made. With the hood closed, make sure it sits evenly against the surrounding body panels on all sides. If it does not...

...loosening the nuts that secure the lock...

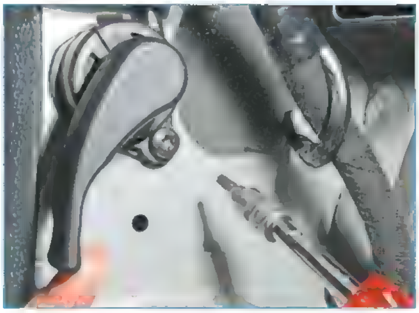
...move it in the required direction right–left and up–down. After lightly tightening the latch mounting nuts, recheck the hood fit. When adjustment is complete, fully tighten the latch mounting nuts. To remove the hood latch cable, remove the latch as shown above.

Unscrew the two nuts securing the coolant expansion tank (see “ Removing the expansion tank,” p. 129) and move the tank to the si de.



Withdraw the cable sheath from the retainer.

Inside the car...



...unscrew with a Torx T-20 key self-tapping screw securing the hood release handle (the instrument panel is removed for clarity).

Remove the hood release handle.

Pull the plastic sleeve of the cable housing out of the rubber seal on the bulkhead and bring the cable into the cabin.

Install the hood latch cable in reverse order.

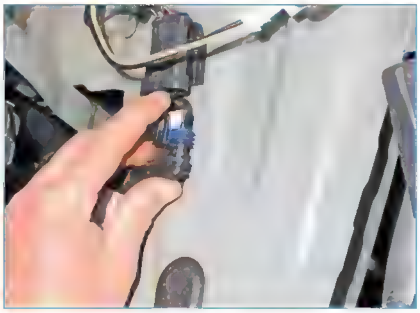
Removal front bumper on a Logan car

Work is performed when repairing and replacing the front bumper and when removing the headlight assembly.

Work is performed with an assistant.

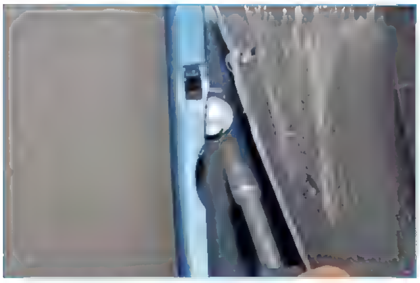
Remove the mudguards of the front bumper (see “Removing the front bumper mudguards,” p. 283).

Unscrew the self-tapping screws that attach the front wheel inner liners to the bumper (see “Removing the front wheel inner liners and splash guards,” p. 284). From the left side...



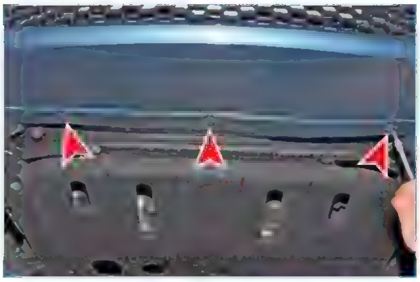
...disconnect the fog light wiring connector from the mating connector wiring harness.

On each side of the bumper...

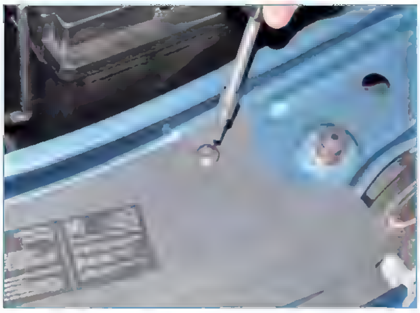


...using a Torx T-30 wrench, we unscrew the one screw of its side mounting each.

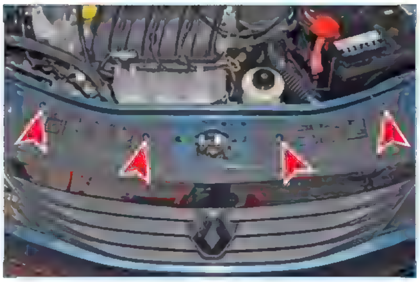
From underneath the vehicle...



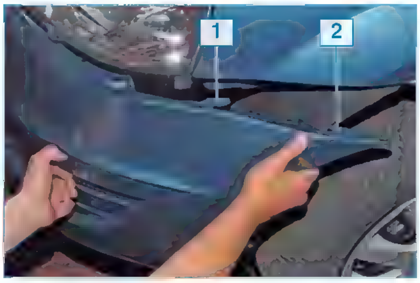
...using a Torx T-30 wrench, we unscrew three screws fastening the bumper to the subframe. With the hood open...



...with the same wrench we unscrew the four screws fastening the bumper to the upper crossmember of the radiator support.



Location of the screws fastening the bumper to the upper crossmember of the radiator support



Press the left side of the bumper so that guide 1 disengages from the wing, and the pin 2 out of the hole in the wing.

Perform the same actions on the right side of the bumper.

Remove the front bumper with an assistant.

Install the front bumper in reverse order.

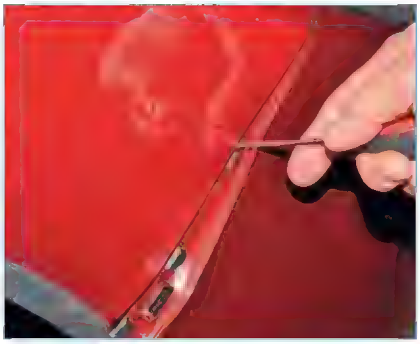
Removing the front bumper on Sandero and Sandero Stepway vehicles

This work is carried out when repairing or replacing the front bumper and when removing the headlamp unit.

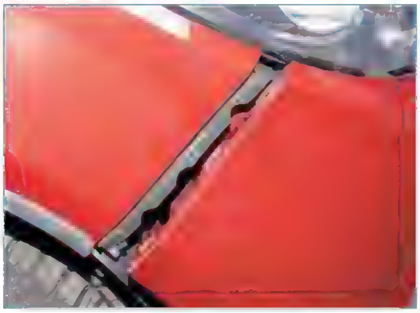
The job is performed with an assistant.

Remove the front bumper splash shields (see “Removing the front bumper splash shields,” p. 283).

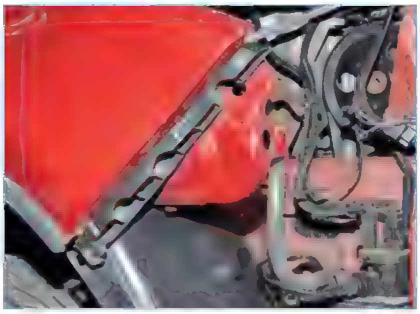
Unscrew the self-tapping screws securing the front wheel arch liners to the bumper (see “Removal of the front wheel arch liners and mudguards,” p. 284). Under the hood, detach the front bumper from the upper crossmember of the body and from below — from the fender apron (these procedures are similar to the operations on the Logan vehicle; see “Removal of the front bumper on the Logan,” p. 286).



Insert a screwdriver into the gap between the front wing and the right bumper side panel (it helps if the tip of the screwdriver is slightly bent) and pry the three tabs of the plastic retainer on the front wing out of the slots in the bumper side panel...



...and disengage the right bumper side panel from the plastic retainer.



In the photo, the approximate positions of the retainer’s tabs are shown on the plastic retainer with white markings.

Similarly, pry out and disengage the left bumper side panel from the plastic holder...

...and remove the bumper with an assistant. Install the front bumper in reverse order.

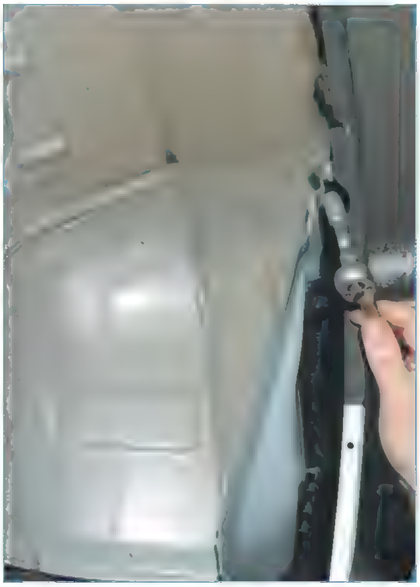
Removing the rear bumper on a Logan

Perform this work when repairing and replacing the rear bumper.

Perform the work with an assistant. Perform this work when repairing and replacing the rear bumper. Remove the license plate light (see “Removing the license plate light, replacing the bulb,” p. 264).

Remove the rear wheel arch liners (see “Removing the rear wheel arch liners,” p. 285).

In the left rear wheel arch...

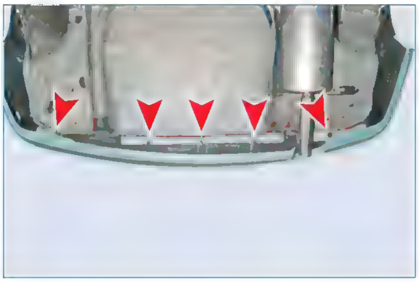


...use a 10 mm socket to loosen the rear bumper mounting bolt.

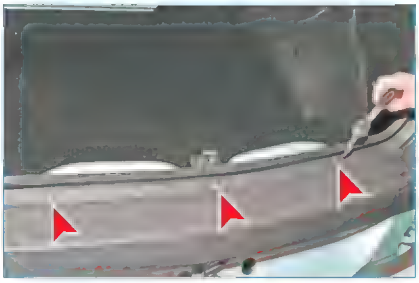
Pull the bumper side away from the body, disengaging the retainers that latch into the bumper,

on the body.

Similarly, disconnect the bumper mounting on the right side.



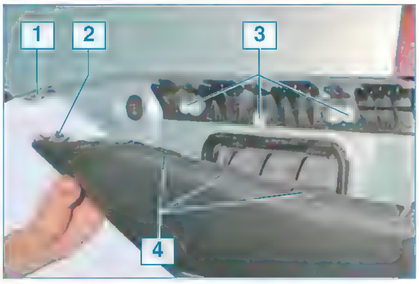
Using a 10mm socket, we loosen the five bolts of the lower bumper mount. With the trunk open...



...use a Torx T-30 bit to loosen the three screws of the upper bumper mount.

Remove the rear bumper with an assistant.

We clean the bumper and its mounting points on the body of dirt. We install the rear bumper in the reverse order.



At the same time, the three retainers 3 on the body must engage in the slots 4 of the bumper, and the pin 2 on the bumper must enter the hole 1 of the body.

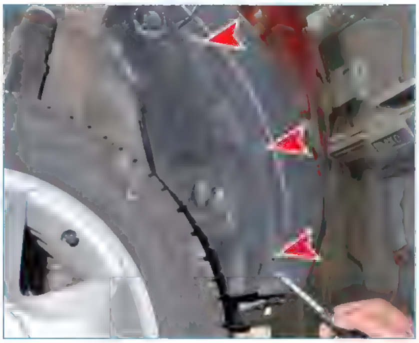
Removing the rear bumper on Sandero and Sandero Stepway vehicles

This procedure is performed when repairing or replacing the rear bumper.

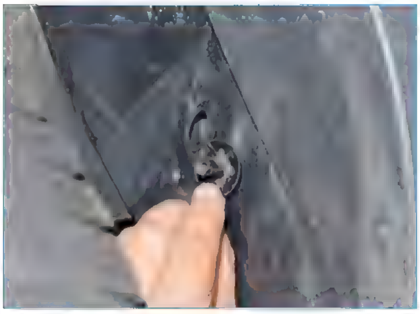
Perform the work with an assistant. The removal operations for the rear bumper are shown on a Sandero Stepway; the procedures for a Sandero are similar.

Remove the license plate light (see “Removing the license plate light, replacing the bulb,” p. 264).

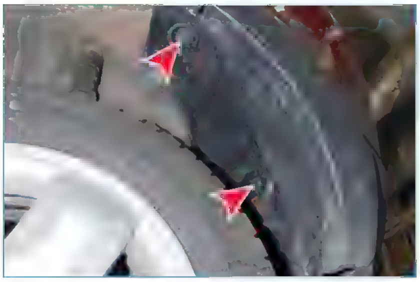
In the left rear wheel arch...



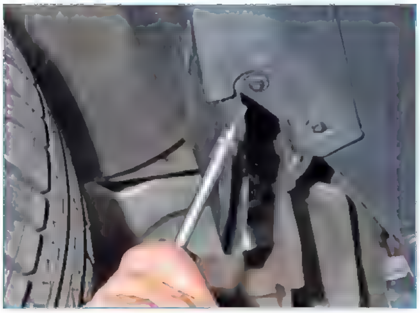
...use a T20 Torx wrench to unscrew the three fasteners securing the rear wheel inner fender to the bumper trim.



Use a flathead screwdriver to loosen the two plastic nuts securing the wheel arch liner to the body.

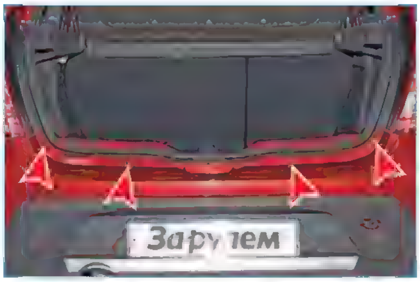


Location of the two nuts securing the wheel arch liner.



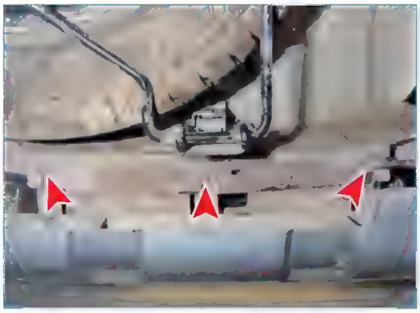
Use a Torx T-20 wrench to loosen the screw securing the wheel arch liner to the rear bumper...

...and remove the wheel arch liner on the left rear wheel. Similarly, remove the wheel arch liner on the right rear wheel. Open the trunk lid...

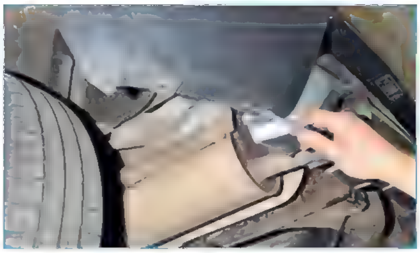


...and with a Torx T-30 bit we unscrew the four screws securing the rear bumper to the body.

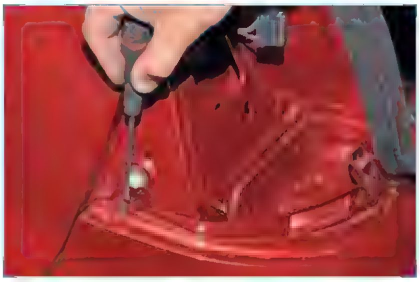
From underneath the car...



...with a 10 mm socket we loosen the three bolts fastening the bumper to the body.

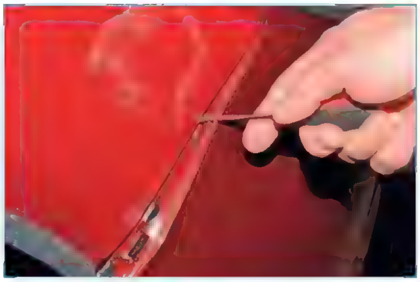


With a Torx T-20 bit we unscrew one screw on each side securing the bumper to the reinforcement. Remove the rear lights (see “Removing the rear lamp, replacing bulbs on Sandero and Sandero Stepway vehicles,” p. 263).

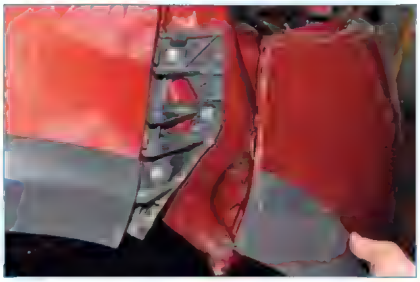


Using a screwdriver, pry out the push-pin retainer...

...and pull the retainer out of the hole. Remove the retainer from the other side in the same way.



Insert a screwdriver into the gap between the rear wing and the left bumper side panel (it's better if the screwdriver tip is slightly bent) and pry the three plastic holder tabs out of the side panel slots...



...and pull the left bumper side panel away from the body, disengaging the bumper's three slots from the plastic holder's latches.

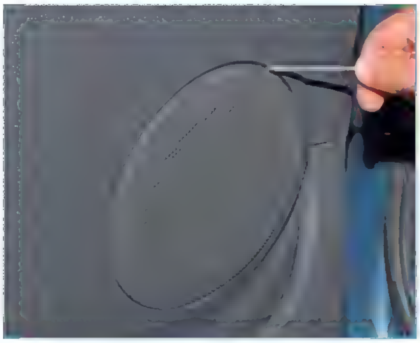
Supporting the left side of the bumper, pull the right bumper side panel away from the body and remove the bumper.

Install the rear bumper in reverse order.

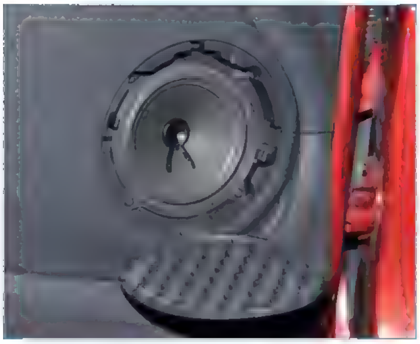
Removing the front door trim

Perform this work when repairing or replacing the exterior mirror, power window regulator, door lock, exterior and interior door handles, or replacing the door glass.

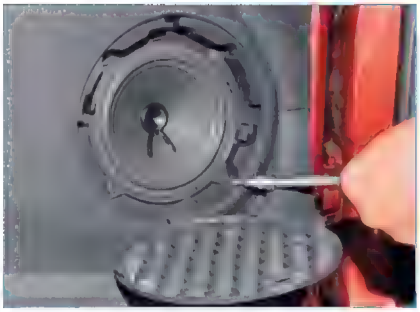
The operations are shown on the driver's door.



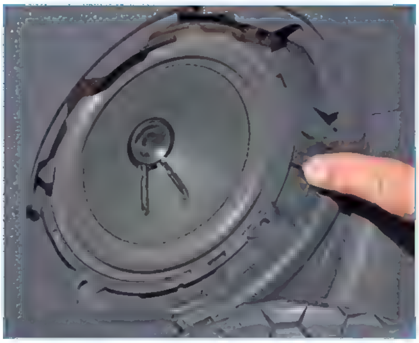
Pry up with a screwdriver...



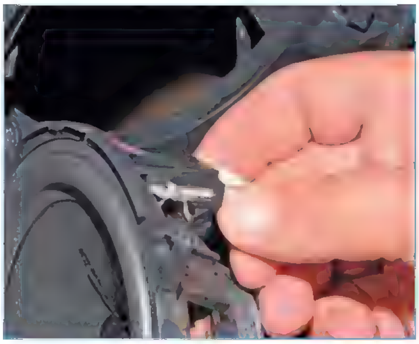
...and we lift off the speaker cover.



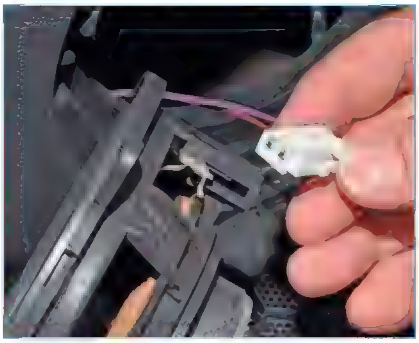
Using a Torx T-20 wrench, we unscrew the four screws securing the speaker to the door trim.



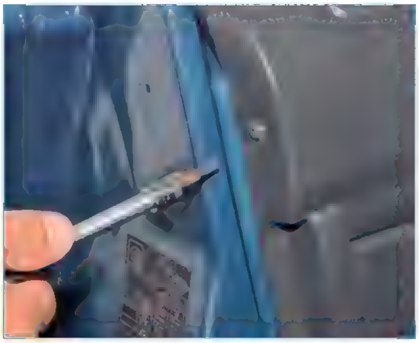
Releasing two clips, we remove the speaker from the recess in the door trim.



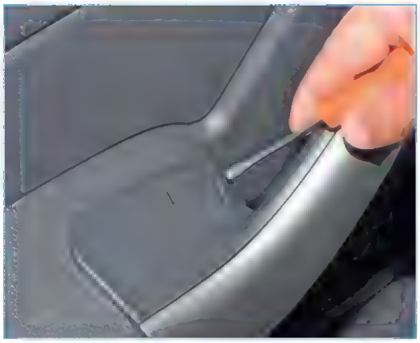
Pressing the retainer...



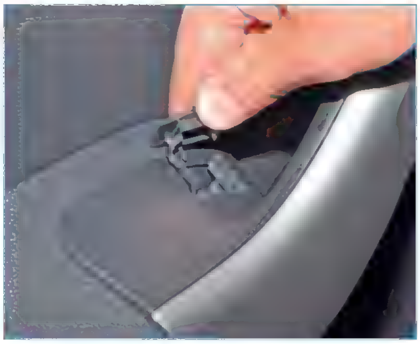
...we disconnect the speaker wiring plug.



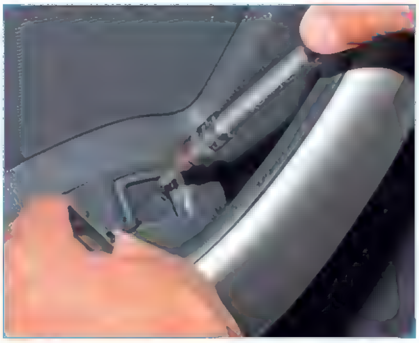
Using a Torx T-20 wrench, we unscrew the screw securing the trim on the edge of the door.



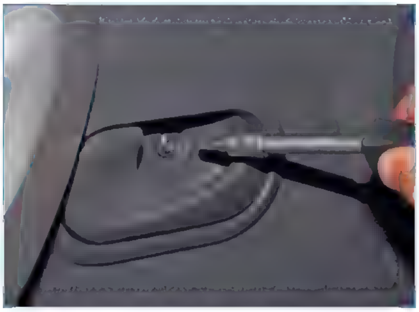
Use a screwdriver to pry up the plug in the armrest...



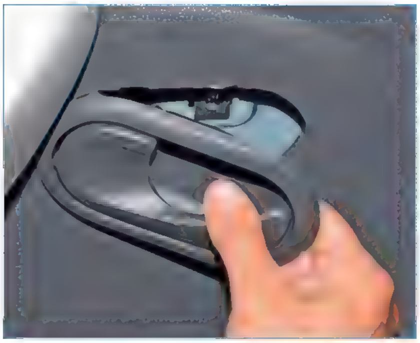
...and fold it back.



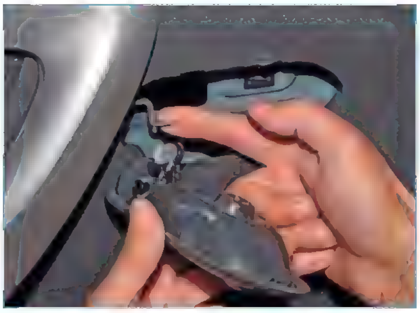
Use a Torx T-20 wrench to unscrew the self-tapping screw securing the armrest mounting in the hole.



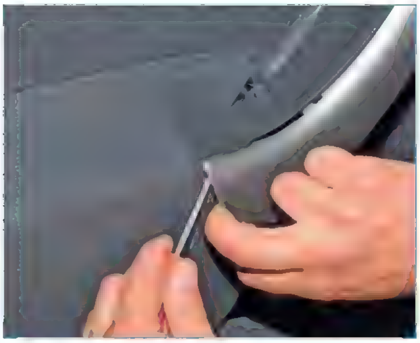
Use a Torx T-30 wrench to unscrew the screw securing the inner door handle.



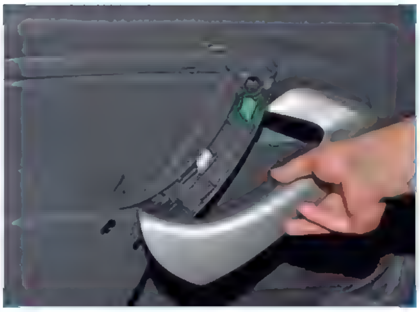
Pull the inner handle out of the opening in the trim...



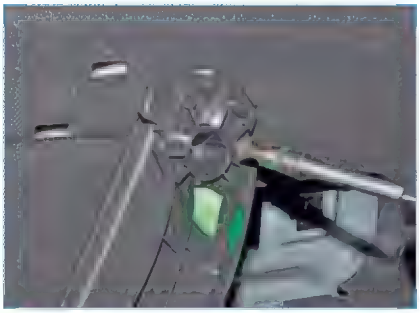
...and remove the inner handle by drawing the rod out of the handle lever opening.



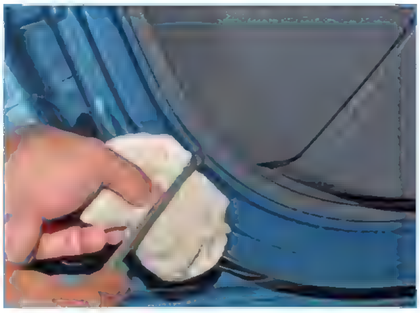
Use a screwdriver to pry up the lower edge of the decorative armrest trim...



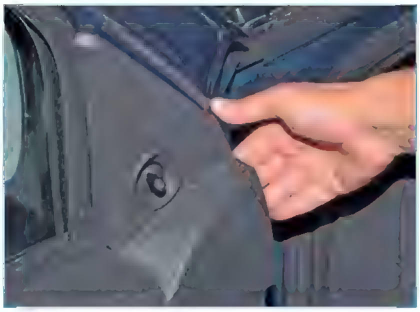
...and, overcoming the resistance of the retainers, remove it.



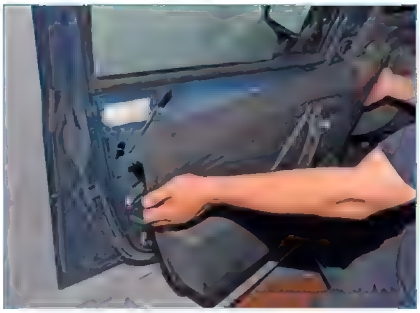
Use a Torx T-30 wrench to loosen the armrest mounting screw.



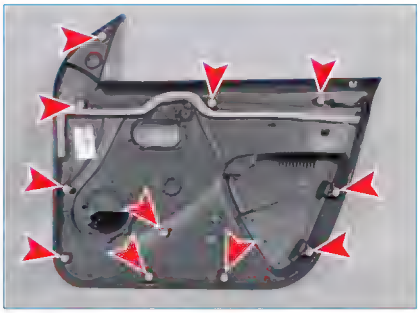
Placing a cloth under the screwdriver, pry the trim away from the inner door panel, disengaging the 11 retainers.



Pull the outer rearview mirror joystick out of the trim opening.



Lift the trim slightly, push the door lock button out of the hole in the trim, and remove the trim.



Location of the retainers on the door trim.

Install the front door trim in the reverse order.

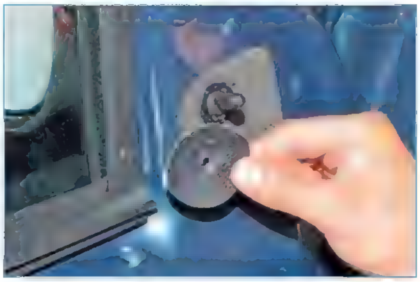
Removal of the exterior rearview mirror

Perform this procedure when repairing or replacing the mirror.

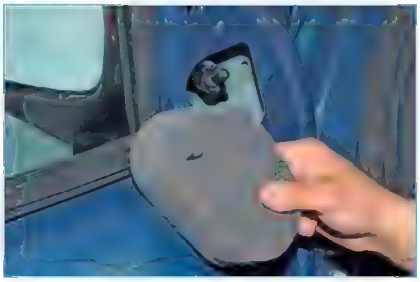
The operations are shown on the left mirror.

Vehicle with manually adjustable exterior mirror

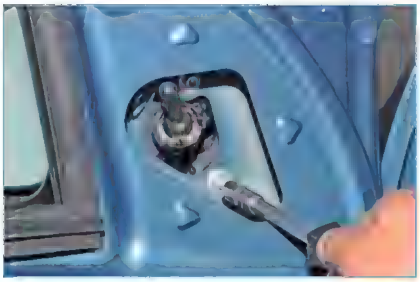
Remove the front door trim (see “ Removing the front door trim”, p. 290).



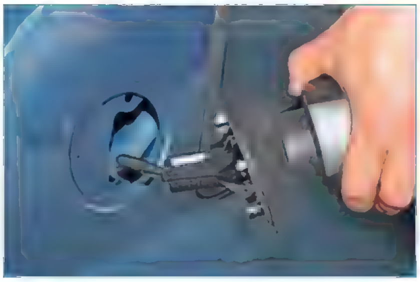
Remove the gasket from the joystick.



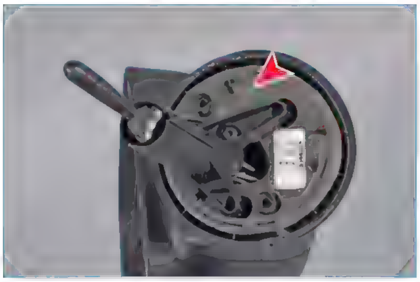
Pull the foam gasket out of the hole in the door.



Using an 8 mm socket or a Torx T-20 wrench, unscrew the two self-tapping screws securing the exterior mirror to the door.



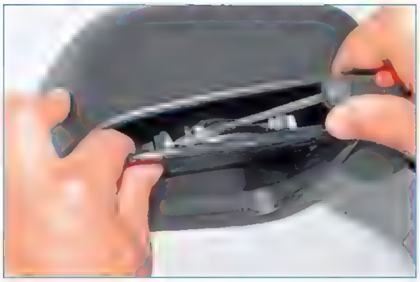
Removing the exterior mirror.



From the outside, the mirror base is sealed with a rubber gasket.

It is not necessary to remove the mirror from the car to replace the mirror element.

To remove the mirror element...



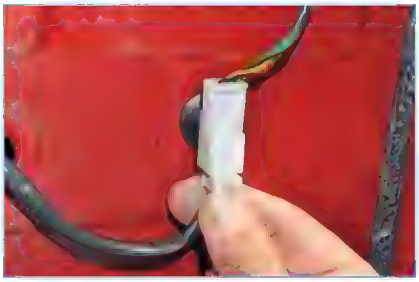
...we turn it as shown in the photo and, inserting a slotted screwdriver into the gap formed, we press out 2–3 locks of the element base (there are eight in total)...

...and we remove the mirror element from the housing.

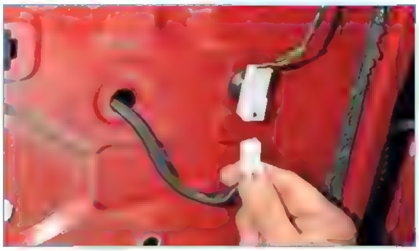
We assemble and install the exterior mirror in the reverse order.

Vehicle with electrically operated exterior mirror

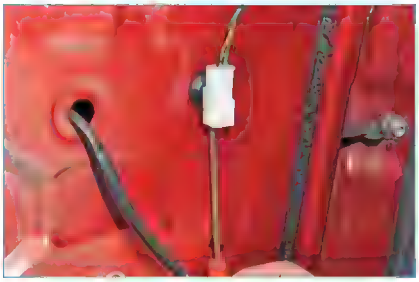
Remove the front door trim (see “ Removing the front door trim,” p. 290).



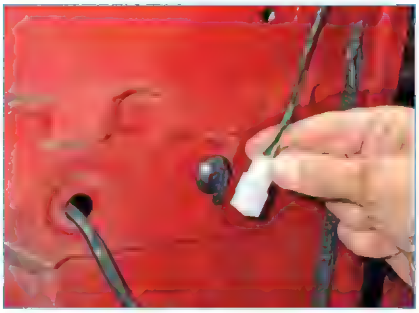
Pressing the retainer...



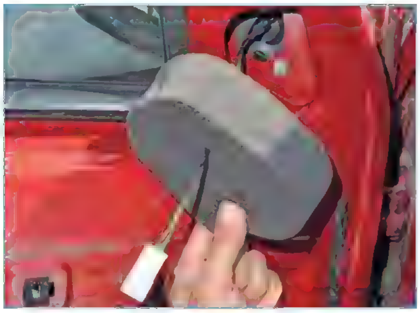
...disconnect the connector of the wiring harness from the connector of the exterior mirror wires.



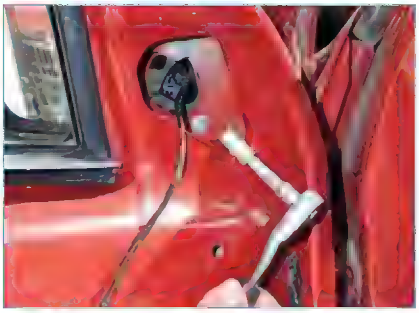
Pressing the retainer with a screwdriver...



...remove the mirror wiring connector from the holder on the door.

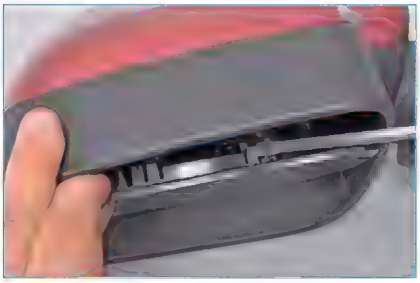


Remove the foam gasket from the hole in the door and, after threading the wire through the hole in the gasket, take it out.

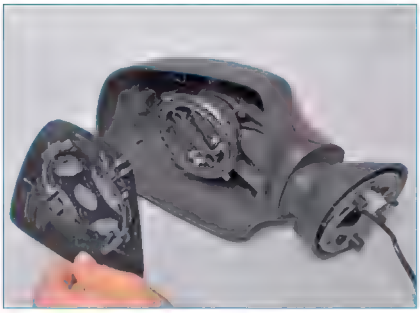


Using an 8 mm socket or a Torx T-20 wrench, unscrew the two self-tapping screws securing the exterior mirror to the door.

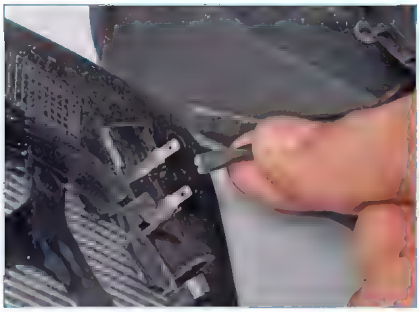
Remove the exterior mirror by pulling its wiring out through the hole in the door. To remove the mirror element...



...rotate it as shown in the photo and, inserting a slotted screwdriver into the gap that appears, pry off 2–3 retainers of the element base (there are eight in total)...



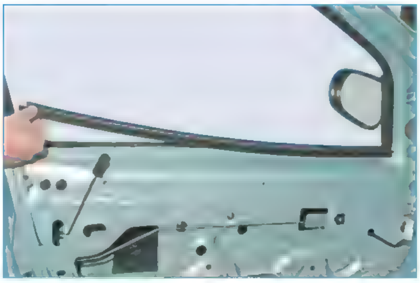
...and pull the element away from the outer mirror housing.



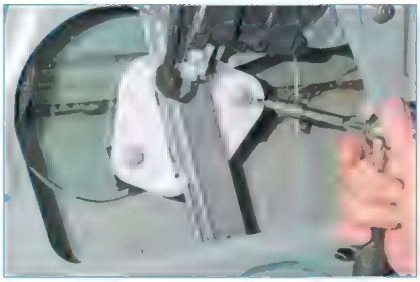
Remove the wire terminals from the contacts of the mirror element and take the element off.
Assemble and install the outer mirror in reverse order.

Front door glass removal

This work is performed when replacing the door glass.
Remove the front door trim (see "Removing the front door trim," p. 290).

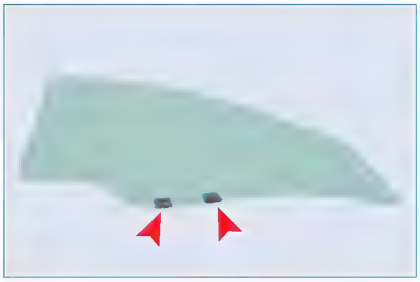


Remove the inner seal glass.
Lower the glass so that the self-tapping screws securing the glass are aligned with the service hole in the inner door panel.



Using a Torx T-20 key or an 8 mm socket, unscrew the two self-tapping screws that attach the glass to the regulator slider.

Rotate the glass and pull it out of the door.



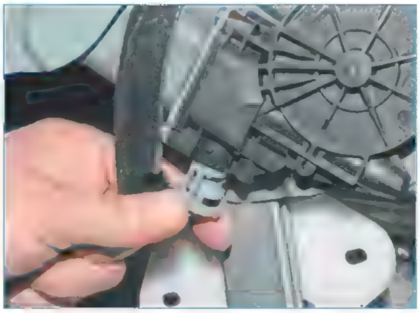
Two plastic pieces are mounted on the glass—of the mass holder.
If the door glass is broken, we clean the door cavity of shards.

You should also remove the window seal from the door frame to better remove any shards.
Plastic holders are transferred to the new glass.
Install the front door glass in reverse order.

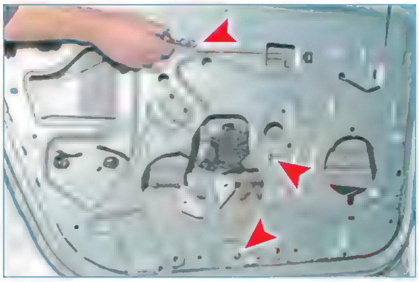
Removal of the front door power window regulator mechanism

This procedure is performed to replace the power window regulator.
Disconnect the cable terminal from the battery's negative terminal.
Remove the front door trim (see "Removing the front door trim," p. 290).
Unscrew the self-tapping screws that secure the glass to the window regulator slider (see "Removing the front door glass").

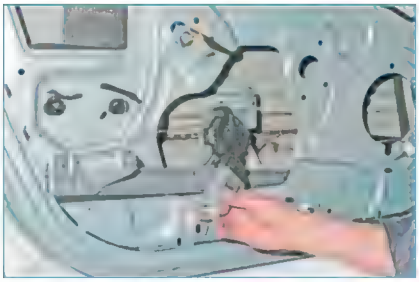
Lift the glass by hand and secure it with insulating tape or adhesive tape.



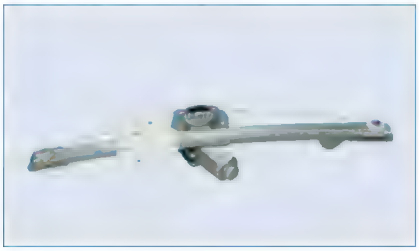
Press the locking tab on the wire connector and disconnect the connector from the window regulator motor.



Using a 10 mm socket, loosen the three nuts securing the window regulator mechanism.



Remove the power window regulator mechanism through the service opening in the inner door panel.



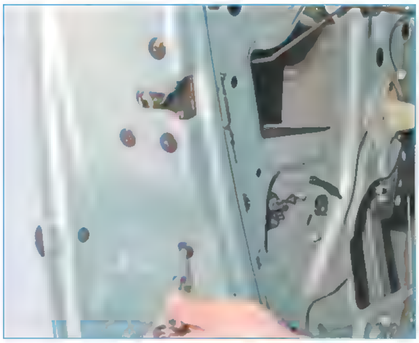
Power window regulator mechanism

Install the power window regulator mechanism in the reverse order.

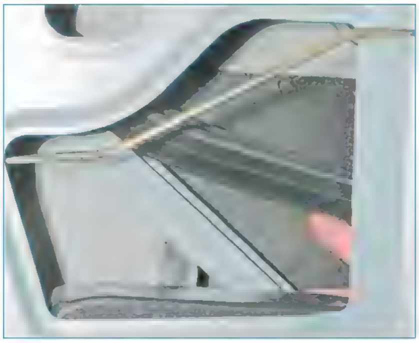
Removal of the front door lock and exterior handle

Perform this work when replacing the lock and exterior handle.
We illustrate the procedures on the driver's door. The lock and handle of the right door are removed in the same way.

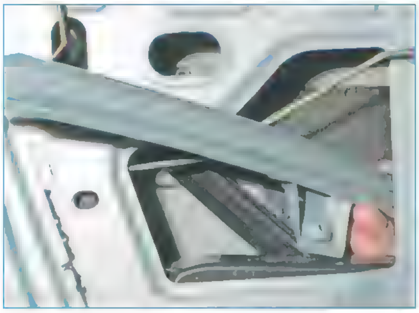
Remove the door trim (see "Removing the front door trim," p. 290).



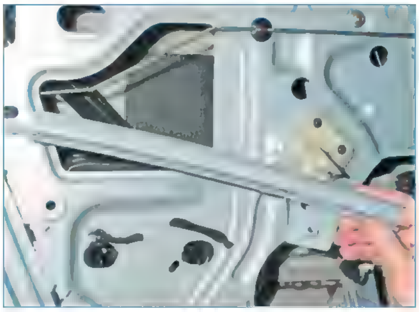
Use a Torx T-30 key to unscrew the screw securing the lower glass guide.



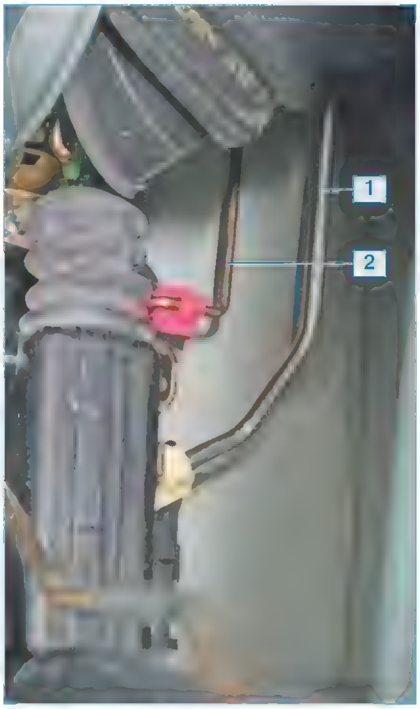
Remove the glass seal from the guide.



Feed the guide through the service hole in the inner door panel...

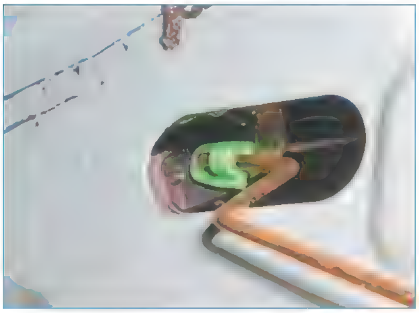


...and remove the lower glass guide.

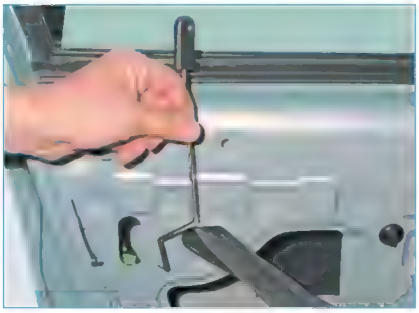


Pressing the plastic retainer of rod 1 for the exterior handle, rotate it around its axis and disconnect the rod from the lock.

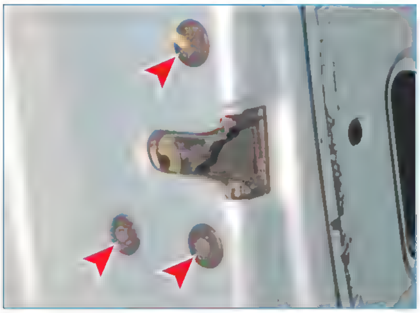
In the same way, disconnect rod 2 of the cylinder lock mechanism.



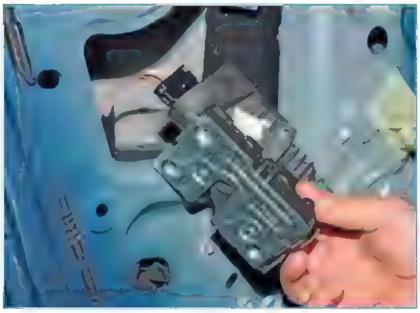
Turn the lock-button rod so the protrusion on the rod fits into the retainer slot...



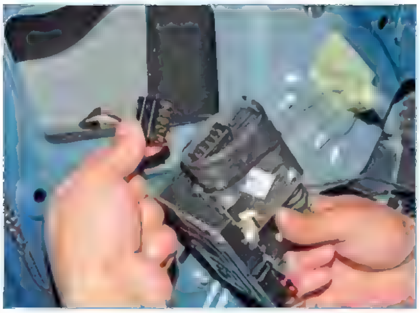
...and remove the rod with the button.



Use a Torx T-30 key to unscrew the three lock mounting screws...



...and pull the lock out through the service hole in the inner door panel.

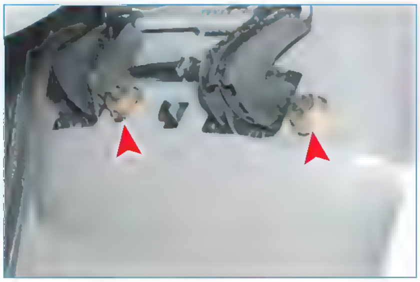


After disconnecting the wire connector, remove the lock assembly with the electric actuator.

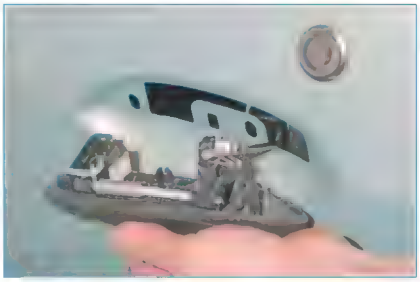
If necessary, disconnect the inner door handle rod from the lock and remove the electric actuator of the lock. These operations are similar to the corresponding operations shown on the rear door lock (see " Removal of the rear door lock and outer handle," p. 300).

Install the front door lock in reverse order.

To remove the outer handle of the front door, remove the lower window guide and disconnect the outer door handle rod from the lock (see above).



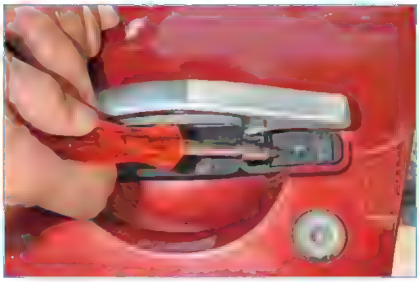
Using a 10mm socket, unscrew the two nuts securing the exterior handle.



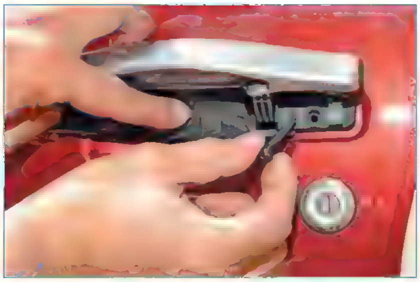
Remove the exterior door handle with the rod, overcoming the resistance.

two latches.

On Sandero and Sandero Stepway, to remove the exterior door handle...

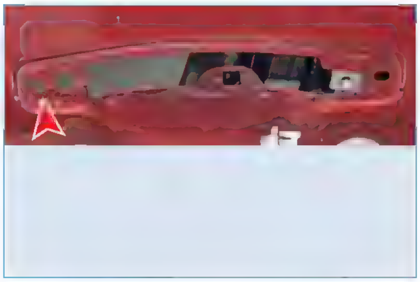


...use a Torx T-20 bit to unscrew the rear mounting screw of the handle base...

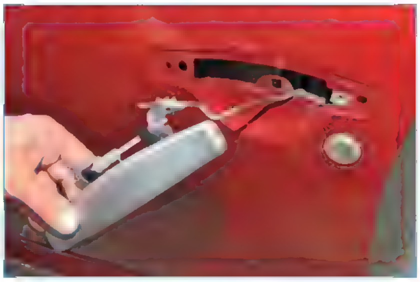


...and pull it out of the hole.

From the inside of the door, use a 10 mm socket to loosen the nut on the front mounting of the base—manual handle.



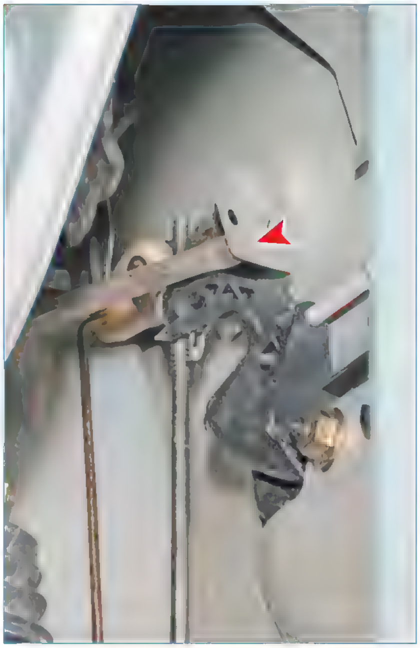
Hole for the front mounting of the handle base.



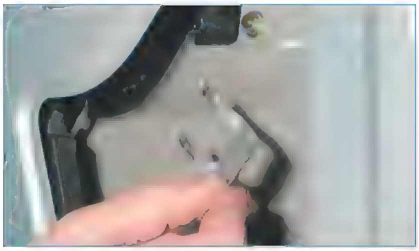
Removing the handle with the rod.

Install the exterior door handle in reverse order (for all vehicles).

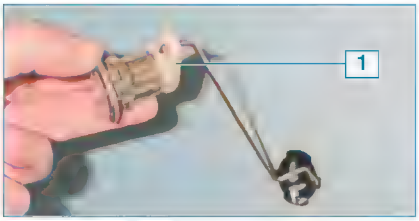
To remove the cylindrical lock mechanism of the front door, remove the lower glass guide and disconnect the cylinder mechanism rod from the lock (see above).



Use a screwdriver to slide the retaining clip of the cylindrical lock mechanism...



...and remove the retainer.



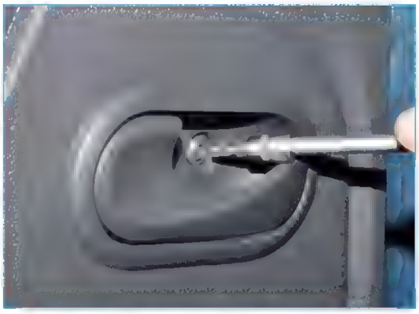
Remove the cylinder lock mechanism with the rod from the hole in the door. Install the cylinder lock mechanism with the rod in reverse order; the plastic lever 1 must face the rear of the door.

Removing the rear door trim on the Logan

Perform this work when repairing or replacing the window regulator, door lock, exterior and interior door handles, or when replacing the glass.

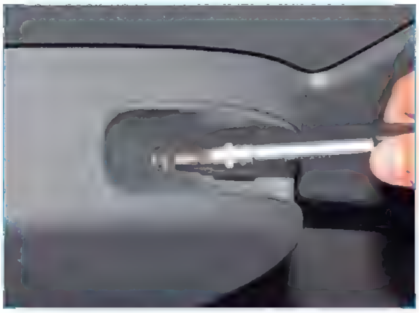
The procedures are shown on a car with manual window regulators. On a car equipped with power windows, the door trim removal procedures are the same, except there is no step to remove the window crank handle.

Remove the window-crank handle by overcoming the resistance of the spring retainer.



Use a Torx T-30 wrench to unscrew the mounting screw of the inner door handle.

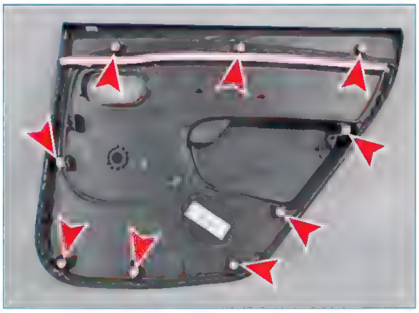
Remove the inner handle by pulling the rod out of the handle lever hole.



Use a Torx T-20 wrench to unscrew the self-tapping screw securing the trim, located in the door armrest.

Remove the decorative insert of the door lock button from the door trim.

Pry the trim away from the door, disengaging nine retainers.



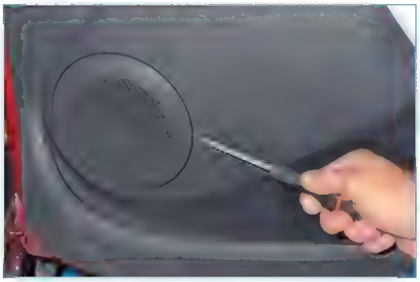
Location of the fasteners on the door trim.

By prying up the trim, pull the door lock release button out of the hole in the trim and remove the trim. Install the rear door trim in reverse order.

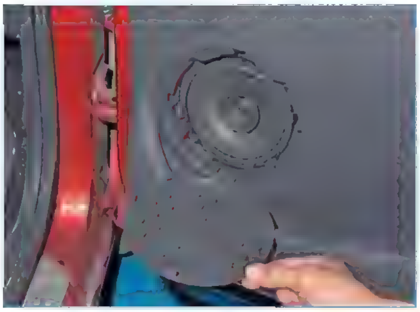
Removing the rear door trim on Sandero and Sandero Stepway vehicles

Perform this work when repairing or replacing the window regulator, door lock, exterior and interior door handles, or when replacing the glass.

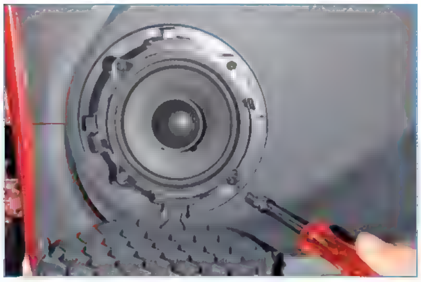
The procedures are demonstrated on a vehicle with manual window cranks. On a vehicle equipped with power windows, the procedures for removing the door trim are the same, except there is no step to remove the window crank handle.



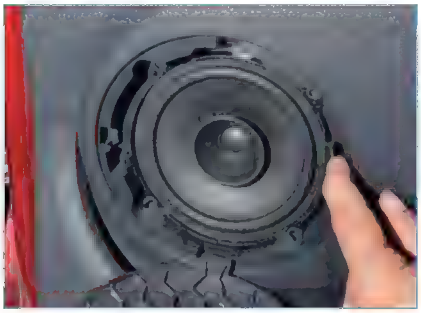
Pry up with a screwdriver...



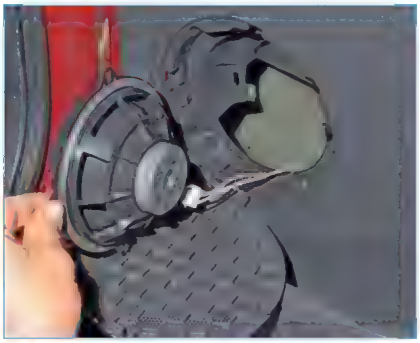
...and flip off the speaker cover.



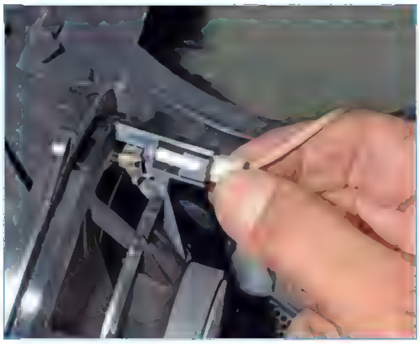
Use a Torx T-20 wrench to remove the four self-tapping screws securing the speaker to the door trim.



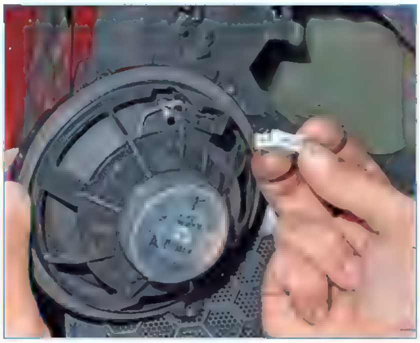
Depress the two retainers...



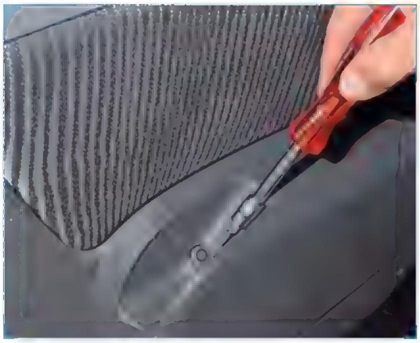
...we remove the speaker from the door trim recess.



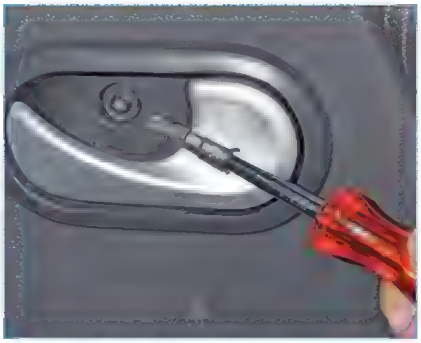
Pressing the retainer...



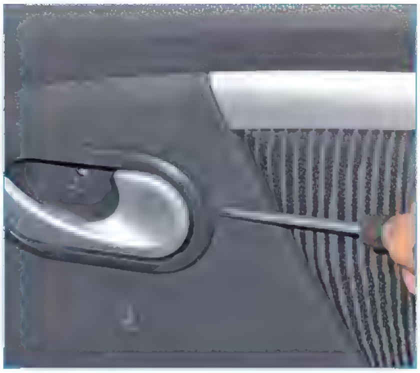
...we disconnect the wire connector from the speaker.



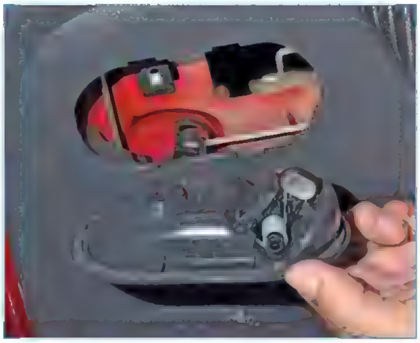
Using a Torx T-20 key, we unscrew the trim mounting self-tapping screw located in the door armrest.



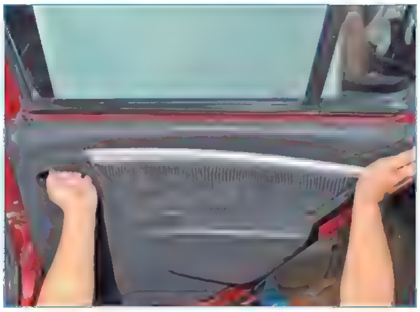
Using a Torx T-30 key, we unscrew the screw securing the interior door handle.



Prying with a screwdriver...



...we remove the inner handle, pulling the rod out of the handle lever hole.



We pry the trim away from the door, releasing nine clips.

Lifting the trim, we guide the door lock release button out of the hole in the trim...

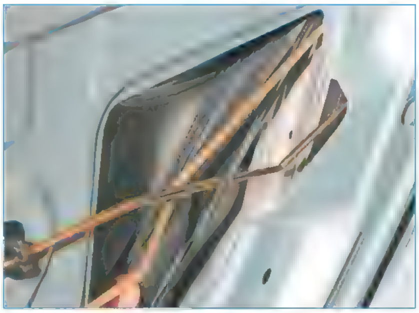
...and remove the trim.

Install the rear door trim in reverse order.

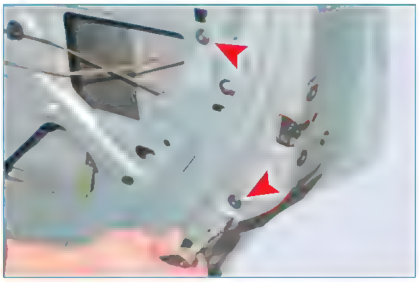
Removing the rear door glass on a Logan

This work is carried out when replacing the door glass.
Remove the door trim (see " Removing the rear door trim on the Logan, p. 296").

Remove the inner glass seal.



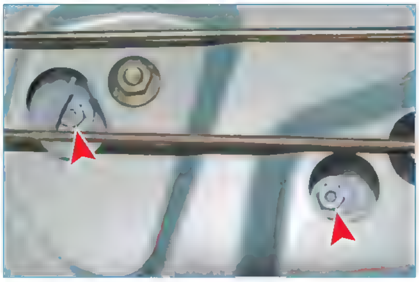
Pull the glass seal out of the lower glass channel.



Using a Torx T-30 key, unscrew the two screws securing the lower glass guide.

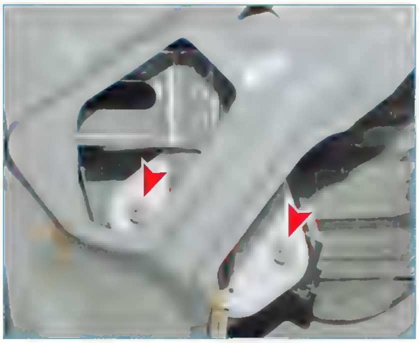
Remove the lower glass channel through the service hole in the inner door panel.

On vehicles with power windows...



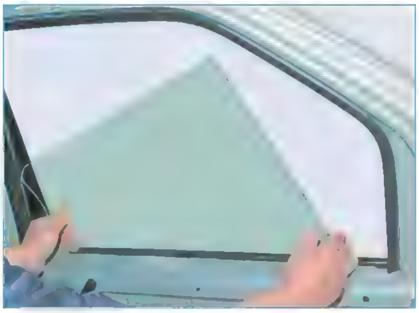
...lower the glass so that the glass mounting self-tapping screws align with the holes in the inner door panel.

Using an 8 mm socket or a Torx T-20 wrench, unscrew the two self-tapping screws securing the glass to the regulator slider.
On vehicles with manual window regulators, fit the window handle onto the shaft and lower the glass until...

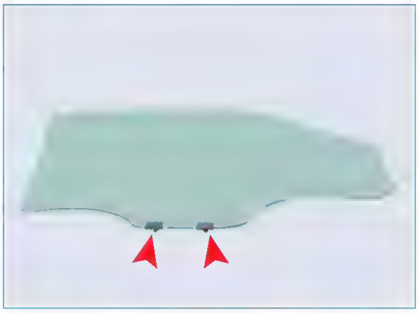


...the glass mounting screws align with the holes in the inner door panel.

Using an 8 mm socket or a Torx T-20 wrench, unscrew the two self-tapping screws that secure the glass to the window regulator slider.



Rotate the glass and remove it from the door.



Two retainers are installed on the glass.

Install the rear door glass in the reverse order.

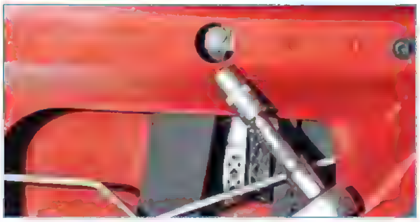
Removing the rear door glass on Sandero and Sandero Stepway vehicles

This work is performed when replacing the door glass.

Remove the rear door trim (see " Removing the rear door trim on Sandero and Sandero Stepway vehicles," p. 296).

To remove the fixed pane of glass...

...remove the inner glass seal.



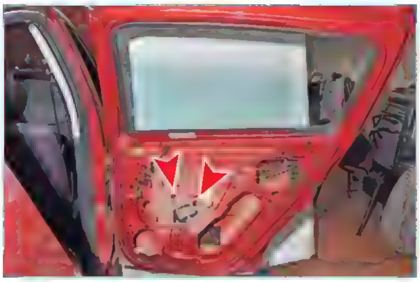
Use an 8 mm socket to loosen the bolt securing the glass guide.

Move the guide down into the door's inner cavity...

...and pull it out through the service hole in the door's inner panel.

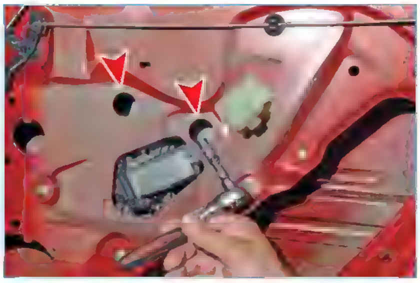
Turning the fixed pane of glass toward the side of the lowering window...

...remove the fixed glass. To remove the movable glass, you must first remove the fixed glass (see above), after which...



...by pressing the power window switch, lower the glass until the screws securing the glass holders to the slider align with the holes in the door's inner panel.

On a car with manual window regulators, place the window crank handle onto the shaft and lower the window.



Use an 8 mm socket to loosen two screws that secure the glass to the window regulator slider.

Rotate the window and remove it from the door.

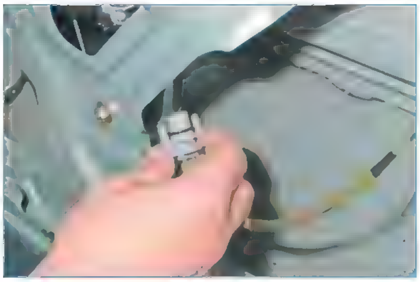
We install the glass in the reverse order.

Removing the rear door window regulator

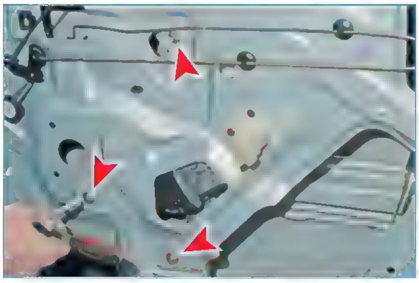
Perform the procedure when replacing the window regulator. Remove the rear door trim. Unscrew the self-tapping screws securing the glass to the window regulator slider.

Raise the glass by hand and secure it to the door frame with insulating tape or adhesive tape.

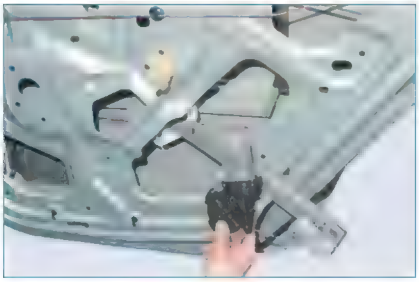
On a vehicle equipped with power windows...



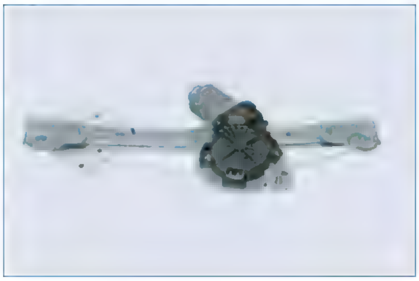
...pressing the retainer, disconnect the wiring plug from the window regulator.



Use a 10 mm socket to loosen the three nuts securing the window regulator mechanism.

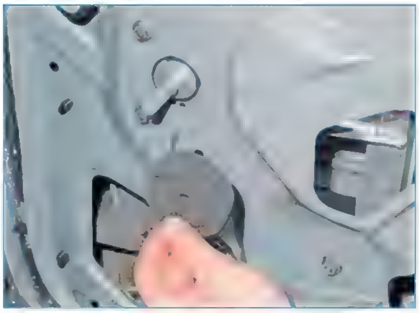


Remove the power window regulator mechanism through the service hole in the inner door panel.

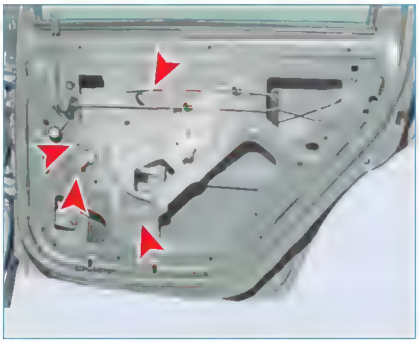


Rear door power window regulator mechanism

When removing the window regulator on a vehicle with manual windows, remove...



...foam pad from the shaft handle.



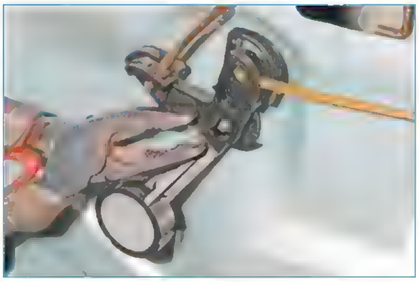
Using a 10 mm socket, loosen the four nuts securing the window regulator mechanism.
Rotating the window regulator mechanism inside the door cavity, remove it through the service opening in the inner door panel.

Install the rear door window regulator in reverse order. At the same time, bring the slider to the mounting hole for securing the glass using the manual or electric drive.

Removal of the rear door lock and exterior handle

Work is performed when replacing the lock and the exterior door handle.

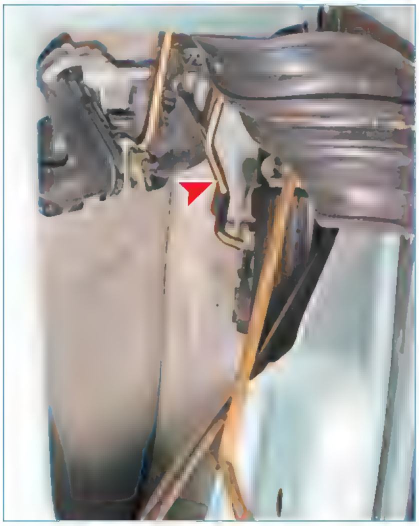
To remove the rear door lock, remove the door trim and the lower window guide.



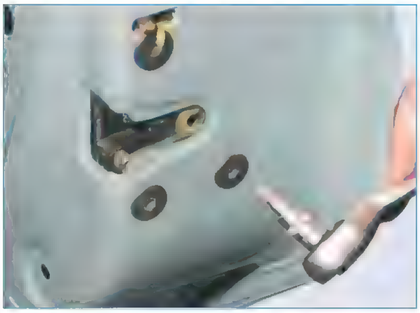
Compress the four tabs of the intermediate lever shaft...

...and remove the lever together with the rods as an assembly.

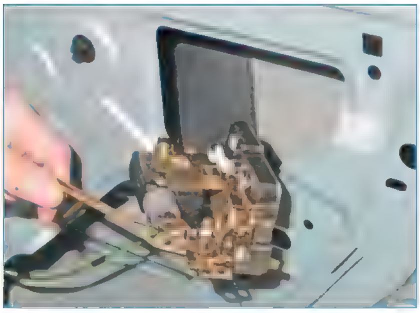
Pull the inner handle rod and the lock-blocking rod out of their retainers.



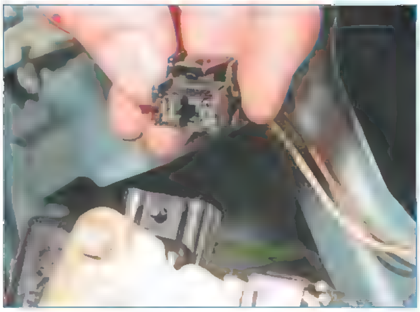
Turn the retainer and disconnect the exterior handle rod from the lock.



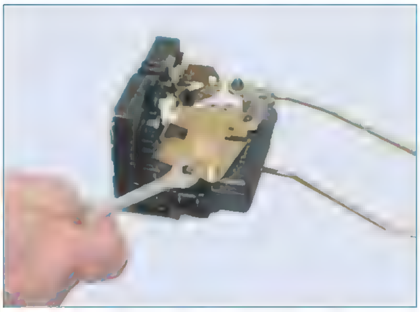
Using a Torx T-30 key, unscrew the three screws securing the lock.



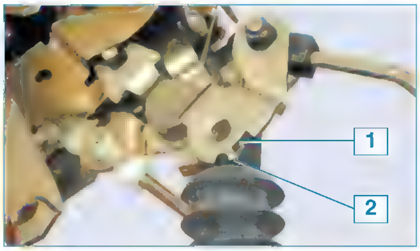
Remove the lock with the electric actuator assembly through the service hole in the inner door panel.



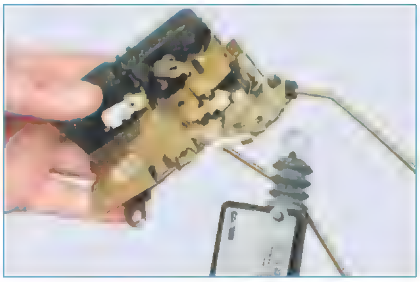
Depress the wiring connector latch, disconnect the plug from the lock's electric actuator, and remove the lock assembly with the actuator.



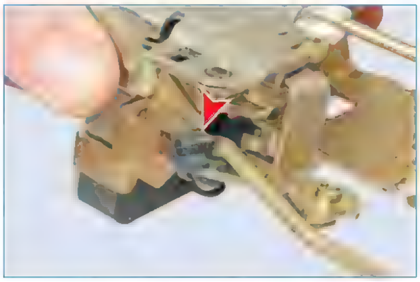
Using an 8 mm wrench, unscrew the self-tapping screw securing the actuator.



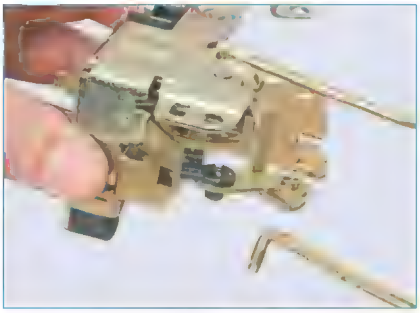
Rotate the electric actuator so that the projection on the actuator rod 2 engages the slot 1 on the lock lever...



...and remove the actuator.



Rotate the plastic retainer to release the leveling rod...

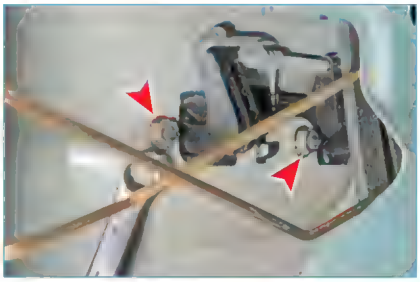


...and disconnect the rod from the lock lever.

Similarly, disconnect the inner handle rod from the lock.

Installing the rear door lock in the reverse order.

To remove the outer handle of the rear door, remove the rear door trim and disconnect the outer handle rod from the lock (see above).



Use a 10 mm box-end wrench to loosen—we loosen the two nuts securing the outer handle to the rear door...

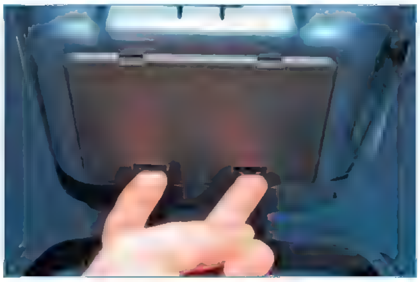
...и снимаем наружную ручку.

We install the outer handle of the rear door in the reverse order.

The outer handle of the rear door on Sandero and Sandero Stepway vehicles is removed in the same way as the outer handle of the front door of these cars (see “Removing the front door lock and outer handle”, p. 294).

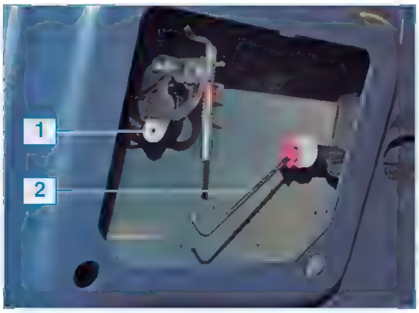
Removing the trunk lid lock on the Logan

Perform this procedure when replacing the trunk lid lock. To remove the lock...

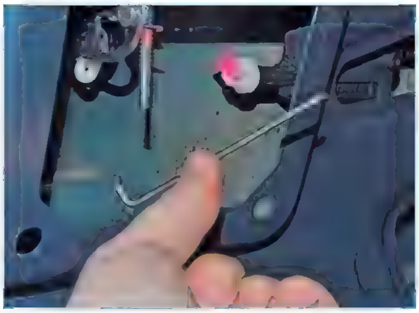


...press the two retainers of the decorative cover...

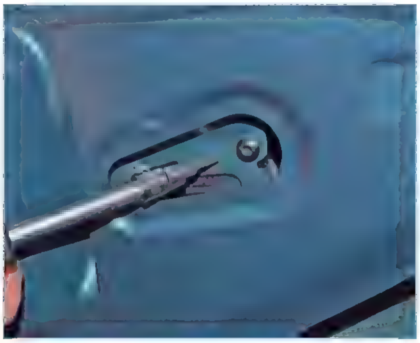
...and remove it.



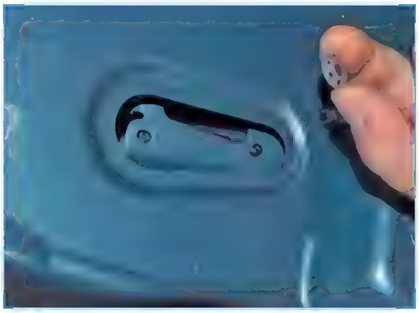
Pull the rod 1 of the electric trunk-lid release drive out of the hole in lever 2 of the lock's cylinder mechanism.



Pressing the retainer, pull the rod out of the hole in the actuator arm of the electric trunk-lid release drive.

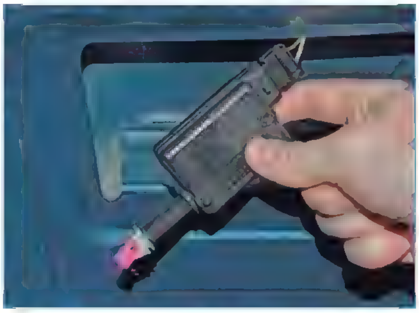


Use a Torx T-20 wrench to unscrew the self-tapping screw securing the electric trunk-lid release drive.

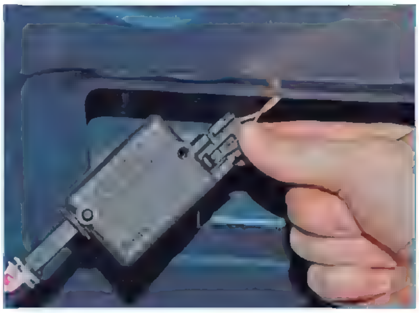


Pry off the conical retaining washer from the pin with a screwdriver.

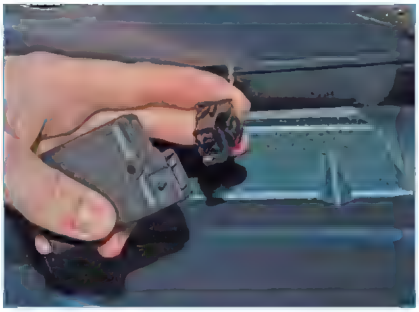
electric drive for opening the trunk lid.



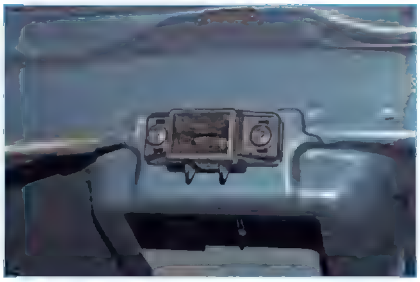
Slide the electric drive for opening the trunk lid toward the hole in the inner panel of the trunk lid.



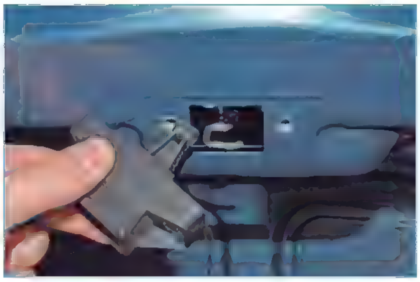
Press the retainer...



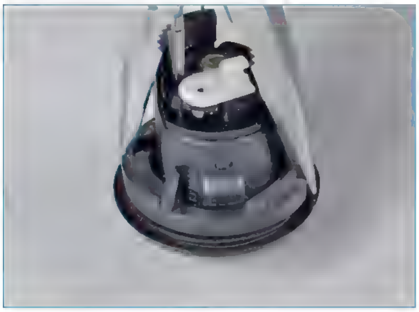
...disconnect the wiring connector from the electric drive for opening the trunk lid.



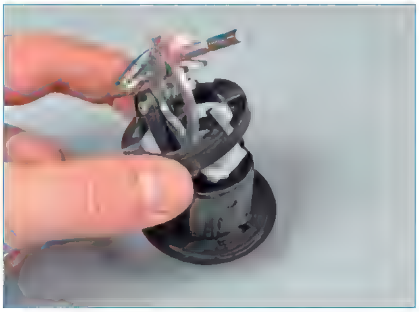
Using a Torx T-30 wrench, unscrew the two screws securing the lock. Pull the lock away from the trunk lid...



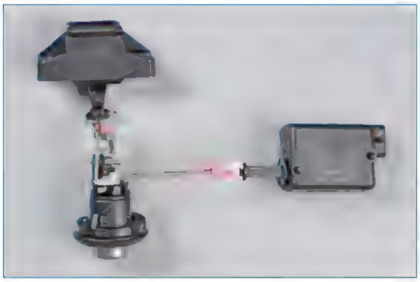
...and, after disconnecting the rod, remove the lock.



Turn the retaining ring counterclockwise so that the two tabs on the lock cylinder body align with the slots in the ring...



...and remove the ring (for clarity shown on the removed cylinder lock mechanism).
Pull the cylinder lock mechanism out of the trunk lid.

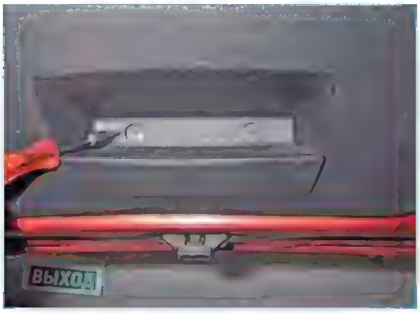


Trunk lid lock assembly with electric drive.

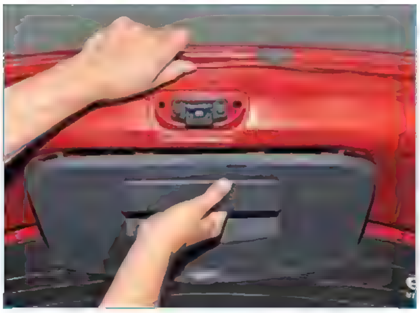
Install the cylindrical locking mechanism in reverse order.

Removal of the tailgate lock on Sandero and Sandero Stepway vehicles

Lift the trunk compartment door.



Using a Phillips screwdriver, unscrew the two self-tapping screws in the trim recess.



Pressing out the trim of the tailgate door from the inner door panel, overcoming the resistance of the six retainers...

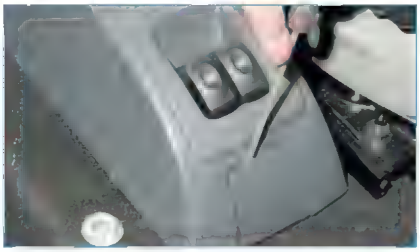
...and remove it.

Further procedures for removing the lock are similar to those for the Logan vehicle (see “Removing the trunk lid lock on the Logan vehicle,” p. 301).

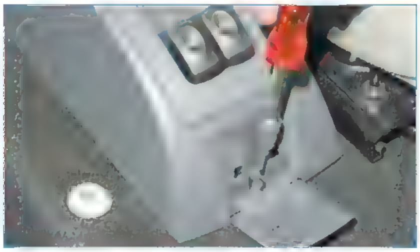
Install the lock and the trunk compartment trim in the reverse order.

Removing the floor tunnel trim

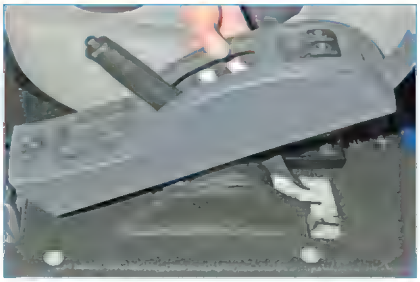
This work is performed to remove the switches for the rear door power windows, the control for the power adjustment of the exterior rearview mirrors, the cigarette lighter, the parking brake lever, and to adjust the parking brake.



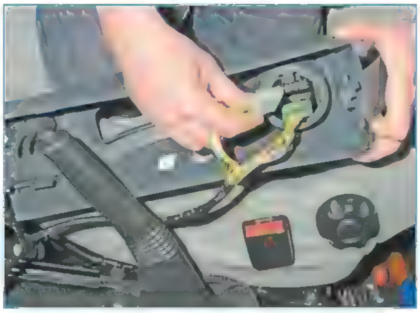
Prying with a screwdriver, open the plug on the rear part of the floor tunnel trim (the driver's seat has been removed for clarity).



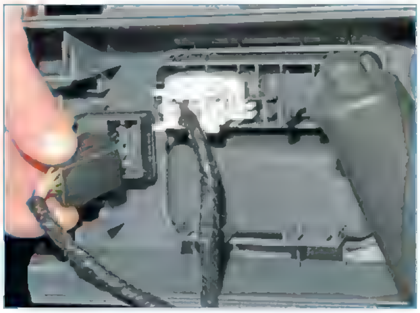
Using a Torx T-20 key, unscrew the self-tapping screw securing the rear part of the trim.



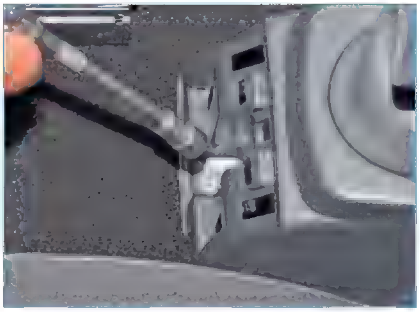
Remove the rear section of the floor tunnel trim from around the parking brake lever.



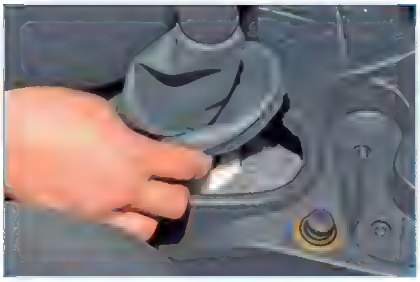
Disconnect the wire connectors from the rear door power window switches...



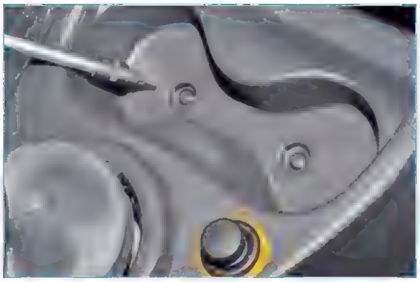
...and from the exterior mirror power adjustment switch and the rear door window lock switch.



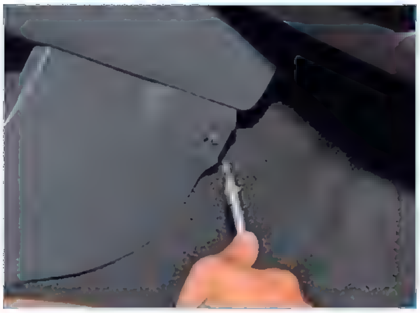
Use a 10 mm socket to loosen the nut securing the front part of the floor tunnel trim.



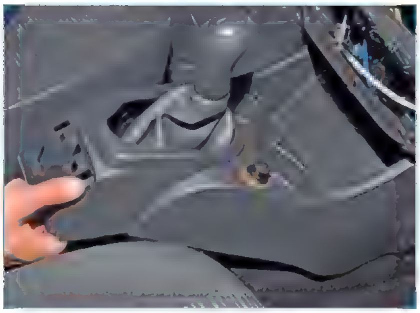
Pull the shift lever boot out of the opening in the trim.



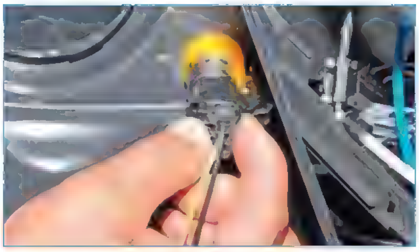
Using a Torx T-20 wrench, unscrew the two self-tapping screws securing the front section of the floor tunnel trim in the cup holder recess.



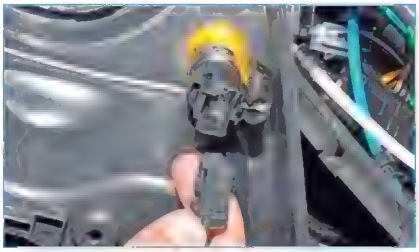
Using a Torx T-20 wrench, unscrew one self-tapping screw on each side that secures the front side of the floor tunnel trim.



Remove the trim from the shift lever by pushing the lever boot into the trim opening.



Press the locking clip...

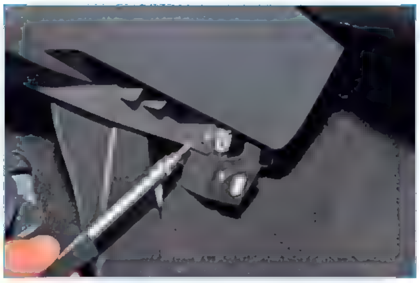


...disconnect the wire connector from the cigarette lighter socket and remove the front portion of the floor tunnel trim.

Install both parts of the floor tunnel trim in the reverse order.

Instrument Panel Removal

Work is carried out when removing the heater, heater fan, or replacing the wiring harness. The procedures are shown on a vehicle equipped with two airbags. Disconnect the cable terminal from the battery "negative" post. Remove the steering wheel (see "Removing the steering wheel", p. 215). Remove the steering-column switches together with the connector (see "Removing the steering-column switches and the connector of the switches from the spiral cable drum assembly", p. 267). Remove the instrument cluster (see "Removing the instrument cluster", p. 276). Disconnect the wire plugs from the ignition switch and the immobilizer coil (see "Replacing the immobilizer coil and the ignition switch", p. 247). Remove the floor tunnel trim (see "Removing the floor tunnel trim", p. 303).

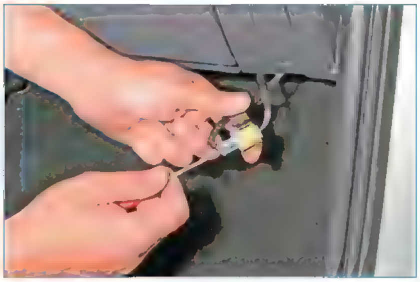


Using a Torx T-20 wrench, unscrew one screw on each side of the lower mount of the center section of the instrument panel from the body.

Remove the instrument panel console cover (see "Removing switches," p. 270).

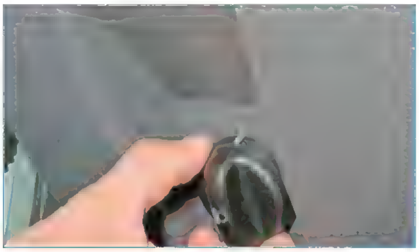
Unscrew the two self-tapping screws securing the heater, ventilation and air conditioning control unit (see "Removing the heater, ventilation and air conditioning control unit," p. 310) and push the unit inward into the instrument panel.

On the right side, from inside the instrument panel, remove the airbag wire connectors with their bracket and pull the connectors with wires out from under the instrument panel.

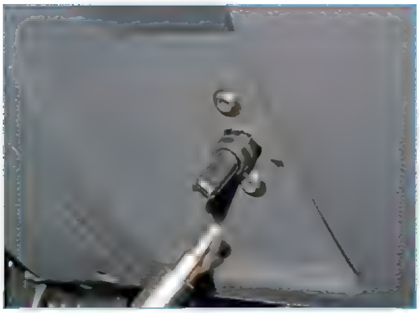


Prying up the retainer with a screwdriver...

...disconnect the wiring harness connector from the airbag wiring connector.



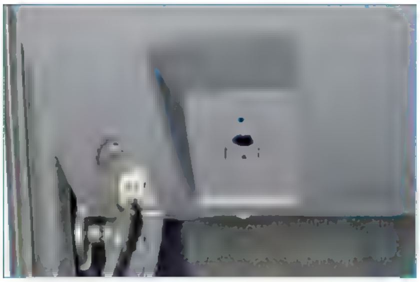
Pulling toward you, remove the headlight beam direction adjustment knob.



Use a Torx T-20 wrench to unscrew the two self-tapping screws securing the headlight beam direction adjuster.

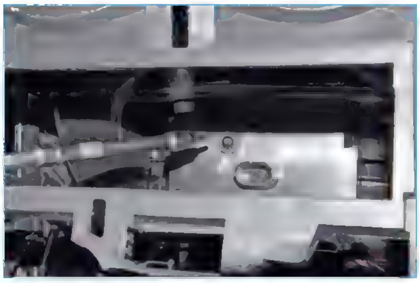
Push the headlight beam direction adjuster inward into t he instrument panel.

Pry off the cover of the instrument panel side mounting screw with a screwdriver.

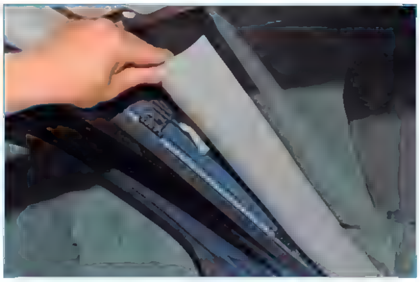


Use a Torx T-20 wrench to unscrew the instrument panel side mounting screw.

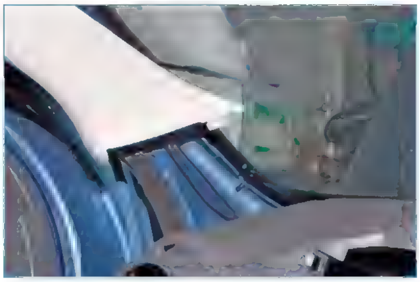
Similarly, loosen the screw on the other side of the dashboard.



Use a T20 Torx wrench to loosen central mounting screw of the instrument panel.



Pushing past the resistance of the plastic clips, pry off the trim of the left front pillar...

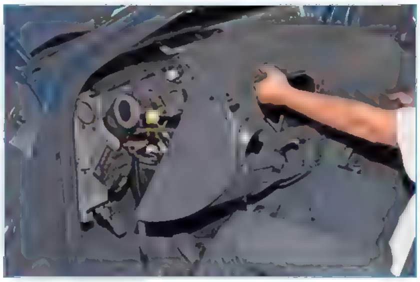


...disengage the lower retainers from the holes in the instrument panel and remove the trim from the left front pillar.A

similarly remove the t бrim from the right й front strut.

Using a Torx T-20 wrench, unscrew the upper mounting screw of the instrument panel.

Similarly, unscrew the screws т from the other side of the instrument panel.

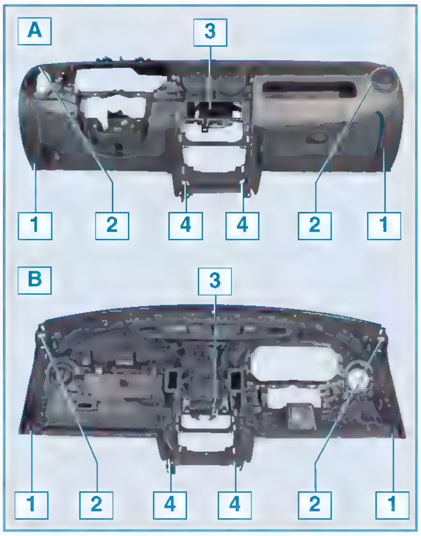


Pulling back the instrument panel...

...and by pressing the retainer, we remove the diagnostic connector from the instrument panel socket.

We remove the instrument panel from the cabin.

Install the instrument panel in reverse order.



Instrument panel attachment points: **1** – side mounting; **2** – upper mounting; **3** – central mounting; **4** – lower mounting; (**A** – outer side of the instrument panel; **B** – inner side of the instrument panel)

Heating, ventilation and air conditioning system

Design description

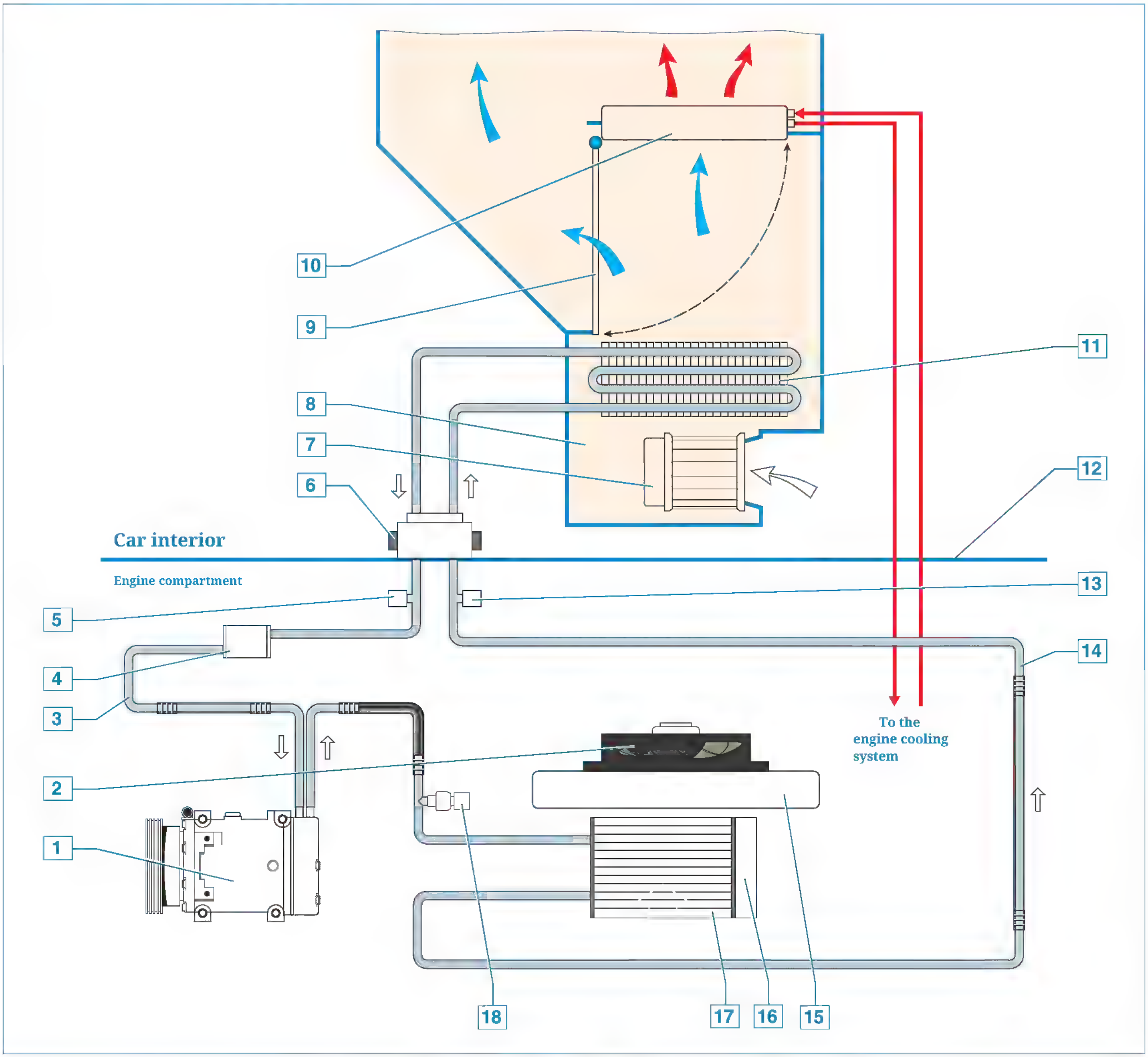
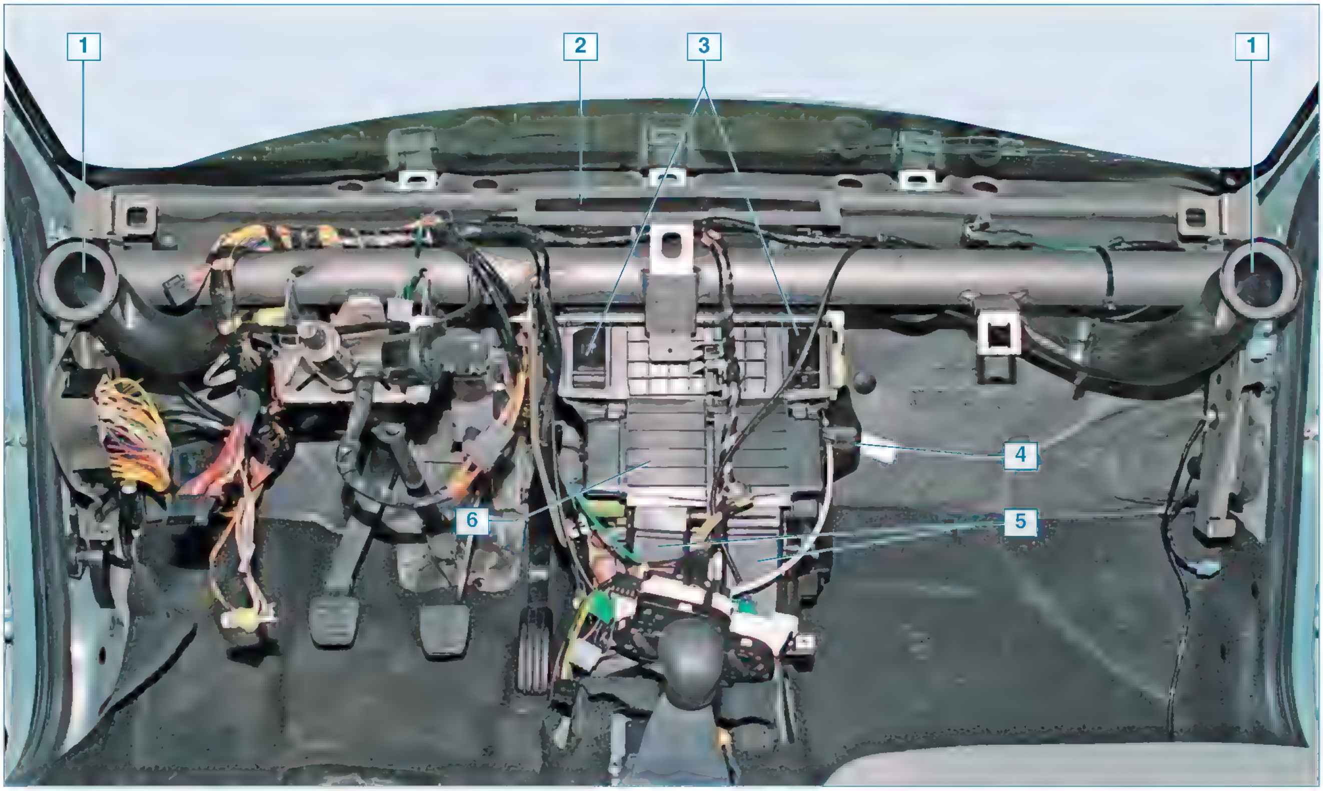

10
9
8
7
6
Car interior
Engine compartment
5
4
3
2
1
11
12
13
14
To the engine cooling system
18
17
16
15

Diagram of the heating, ventilation and air conditioning system: **1** – compressor; **2** – engine cooling fan; **3** – low-pressure line; **4** – reservoir; **5** – valve for charging and discharging refrigerant from the low-pressure line; **6** – reducer; **7** – heater fan; **8** – heater housing; **9** – temperature control flap; **10** – heater radiator; **11** – evaporator; **12** – front shield; **13** – valve for charging and discharging refrigerant from the high-pressure line; **14** – high-pressure line; **15** – engine cooling radiator; **16** – receiver; **17** – condenser; **18** – refrigerant pressure sensor



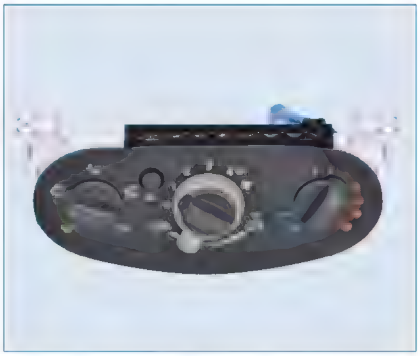
Location of the heater and ducts of the heating, ventilation and air conditioning system: 1 – duct to the side deflector; **2** – duct to the windshield vent grille; **3** – duct to the central deflectors; **4** – heater fan electric motor; **5** – ducts to the rear seat passengers' footwells; **6** – heater

The vehicle may be equipped either with a heating and ventilation system or with a heating, ventilation and air conditioning system, which serve to create the most comfortable conditions for the driver and passengers regardless of the weather.

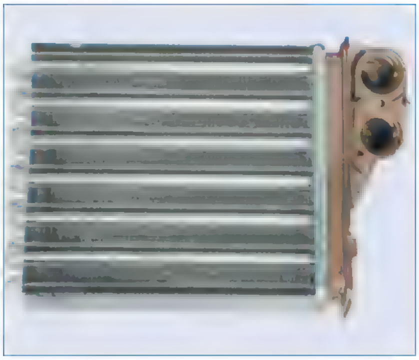
The ventilation and heating system includes: the heater, the heater fan, the air ducts, and the deflectors. Through the air ducts, air from the heater is supplied to the vents for blowing the windshield and side windows, to the central and side deflectors on the instrument panel, and also to the ventilation openings in the heater housing to deliver air to the feet of the driver and passengers. The system is controlled by turning the knobs located on the heating control unit, ventilation, and air conditioning. The control unit is mounted on the instrument panel console. The heater is installed under the instrument panel in the center, and the air ducts are secured beneath the cross beam of the instrument panel. The heater housing contains the heater fan, distribution flaps that direct air flows to specific zones, and the heater core, which is connected by hoses to the engine cooling system. Coolant constantly circulates through the heater core. Depending on the position of the flap linked to the temperature control, outside air can pass through the heater core or bypass it.

As the vehicle moves, air enters the heater through the openings located in the left and right decorative trim pieces of the front panel. To increase the airflow into the cabin while the vehicle is moving, and also when parked, the heater fan is used.

The intensity of the air supply is determined by the rotational speed of the fan. The electric motor



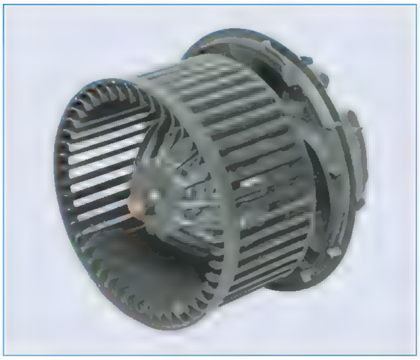
Heating, ventilation and air conditioning control unit



Heater core

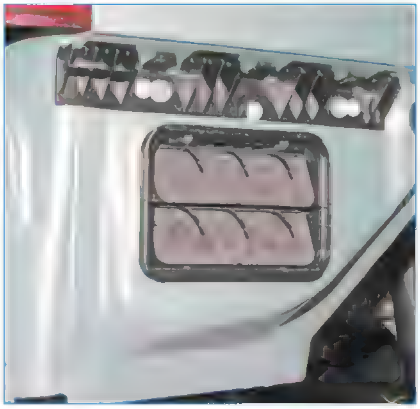
Depending on the connection of the additional resistor, the fan can run at four different speeds.

Airflow control in the passenger compartment is performed by the air distribution regulator, which is mechanically linked to the dampers by rods.



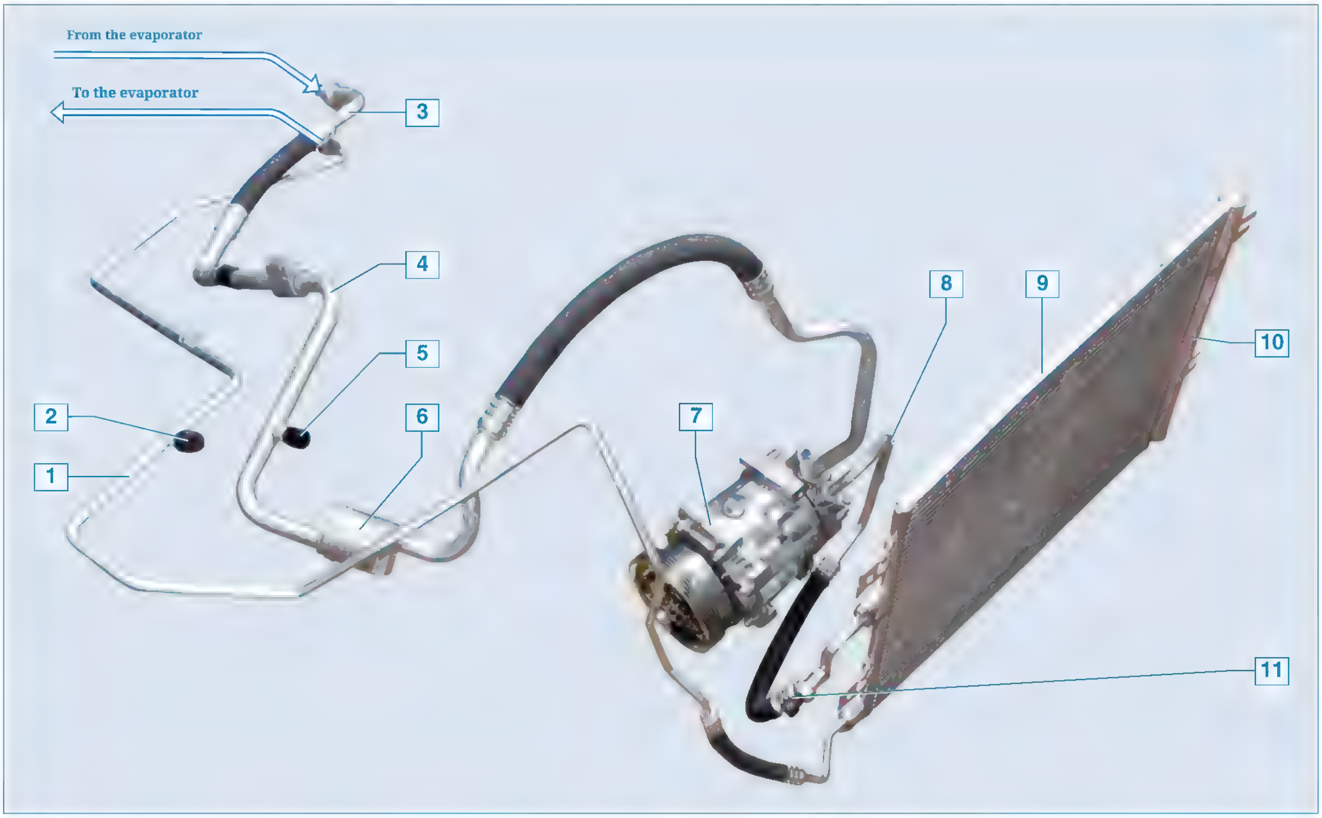
Heater fan

By operating the dampers, the regulator directs air through the ducts to the central and side deflectors, to the lower ventilation openings in the heater casing, and to the windshield vent grilles located in the instrument panel.

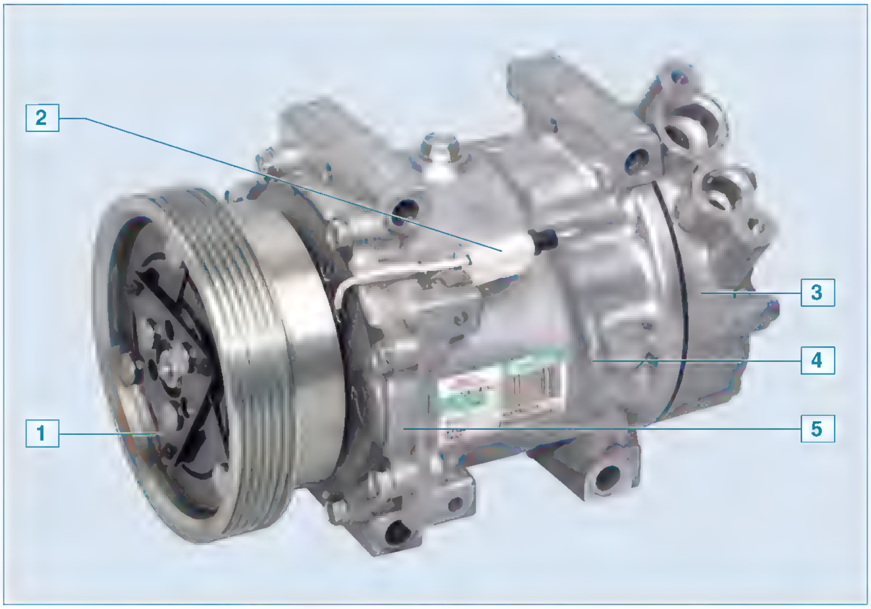


Cabin air outlet valves (with rear bumper removed)

Air leaves the cabin through openings located at the top of the trunk side panels and then exits to the outside through valves installed behind the rear bumper side panels.



Air conditioning system components: 1 – high-pressure line; **2** – service valve for charging and discharging refrigerant in the high-pressure line; **3** – rear section of the low-pressure line; **4** – front section of the low-pressure line; **5** – service valve for charging and discharging refrigerant in the low-pressure line; **6** – damper; **7** – compressor; **8** – high-pressure line connecting the compressor and condenser; **9** – condenser; **10** – receiver; **11** – pressure sensor



Air-conditioning compressor: **1** – pulley with electromagnetic clutch; **2** – outlet pro-electromagnetic clutch fluid; **3** – rear cover; **4** – housing; **5** – front cover

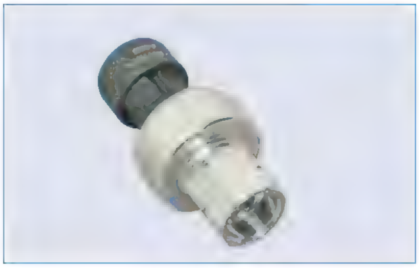
Condenser. A — receiver-drier

To speed up cabin heating and to prevent intake of outside air into the cabin (when driving through smoky or dusty road sections), the air recirculation system is used. When the recirculation mode lever is moved, the recirculation system damper blocks outside air from entering the vehicle cabin, and the air inside the vehicle cabin then begins to circulate in a closed loop without exchanging with outside air.

Some vehicles are equipped with an air conditioning system. The air conditioning system is designed to reduce the temperature and humidity of the cabin air. The air conditioner is switched on by pressing the air conditioning switch located in the heating, ventilation and air conditioning control unit, and the heater fan must be on. When the air conditioner is switched on, the indicator in the air conditioning switch lights up.

The air conditioning compressor is mounted on the front of the engine bracket, below the alternator. The compressor compresses the refrigerant coming from the evaporator, which is in a low-pressure gaseous state of 0.5–2.0 bar. At the compressor outlet the pressure of the refrigerant vapor increases and the temperature reaches 80–100 °C. The compressor is driven by a multi-rib belt from the accessory drive pulley. A friction electromagnetic clutch is built into the compressor pulley to engage and disengage the compressor shaft from the pulley based on signals from the engine control unit.

After the compressor, the refrigerant vapor flows into the condenser located in front of the engine cooling radiator. When the condenser plates are blown by the airflow generated while the vehicle is moving, and also by the cooling system fan, the high-pressure refrigerant (15.0–20.0 bar) changes from a gaseous to a liquid state. A receiver-drier is built into the left side of the condenser. The receiver-drier is also equipped with a filter to remove impurities from the refrigerant. From the condenser the refrigerant flows into the expansion valve, which is a throttle valve at the outlet of which the refrigerant's pressure and temperature drop sharply (to about 1.0 bar and −7 °C, respectively), causing the refrigerant to change from a liquid to a gaseous state. The refrigerant then flows into the evaporator, located



Refrigerant pressure sensor

under the instrument panel in the heater housing. The airflow passing through the heater housing via the air conditioner evaporator, driven by the heater fan, causes the refrigerant to evaporate. As the air gives up heat to the refrigerant in the evaporator, it becomes colder. From the evaporator the refrigerant is again drawn in by the compressor, and the operating cycle repeats. High- and low-pressure lines are fitted with valves for charging and releasing refrigerant from the air conditioning system. A refrigerant pressure sensor is installed on the line between the compressor and the condenser.

The pressure sensor sends a signal to the ECU, which controls the engine cooling system electric fan depending on the refrigerant pressure and the vehicle speed.

In addition, based on signals from the pressure sensor, the ECU turns off the air conditioning compressor if refrigerant pressure in the system drops to 2.0 bar or rises to 27.0 bar. A shut-off valve is installed in the pipe fitting under the pressure sensor, which closes when the sensor is unscrewed. Therefore, replacing the pressure sensor will not cause refrigerant to leak from the air conditioning system.

The refrigerant in the air-conditioning system is under high pressure. When performing work that may cause the air-conditioning system to lose its seal, avoid refrigerant getting into the eyes, on the skin, or into the respiratory tract.

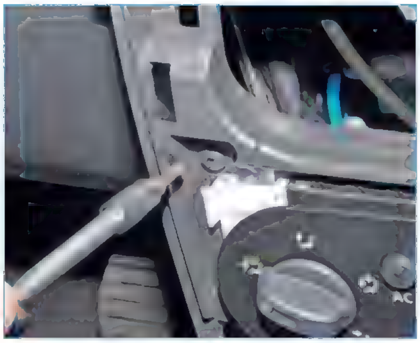
Any work involving refrigerant must be carried out only in a well-ventilated area.
When charging the air conditioning system, only materials recommended by the manufacturer should be used.

Welding or soldering work on air conditioning system components is prohibited. Repair and maintenance of the air conditioning system should be carried out at specialized service centers. Special equipment is used to detect leaks in the system, and a special contrasting agent must be introduced into the system. After removing the refrigerant from the system, air must be evacuated to remove any remaining moisture. Before charging, a special oil recommended by the manufacturer must be added to the system.

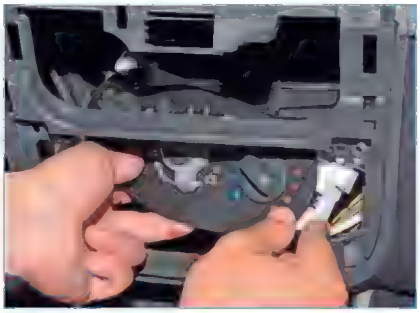
Removal of the heating, ventilation and air conditioning control unit

We remove the unit to replace failed control linkage rods, the illumination lamp, or to replace the entire assembly.

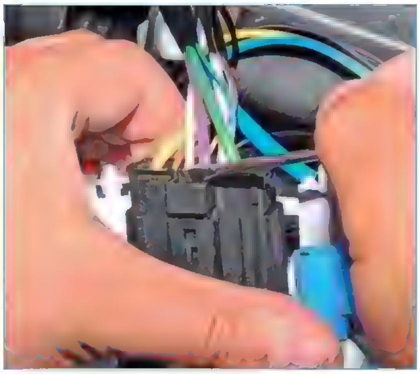
Remove the instrument panel console trim (see “Removing switches,” p. 270).



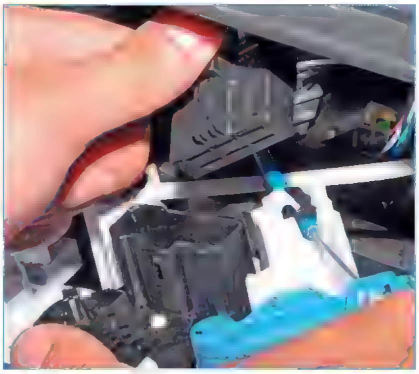
Using a Torx T-20 wrench, loosen the two self-tapping screws securing the unit.



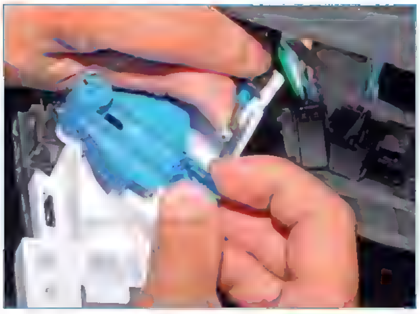
Withdraw the control unit from the instrument panel console.



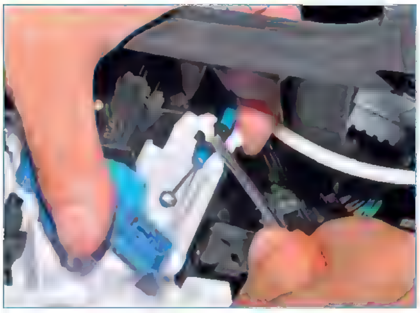
Depress the retainer with a screwdriver...



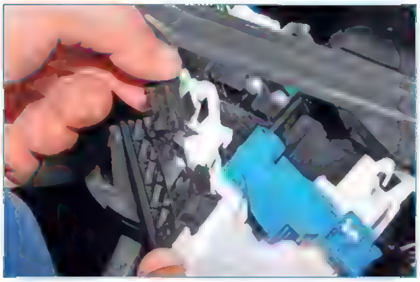
...disconnect the wiring harness connector from the unit.



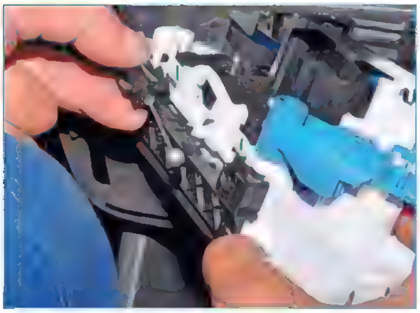
Disconnect the end of the actuator rod for the air temperature control flap from the regulator sector.



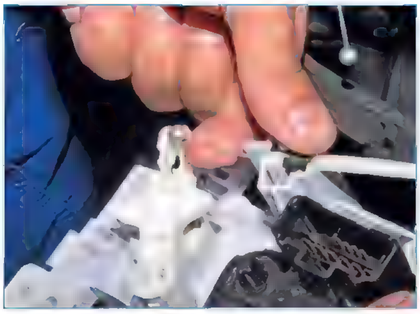
Using a screwdriver, pry the actuator rod sheath of the air temperature regulator out of its retainer.



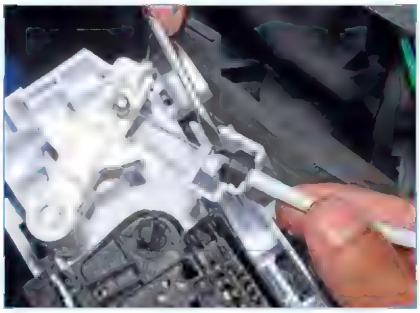
Withdraw the sheath of the recirculation flap actuator rod from the holder.



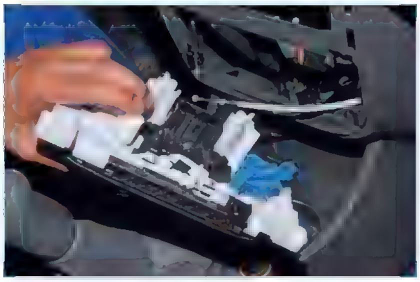
Disconnect the end of the recirculation flap actuator rod from the lever.



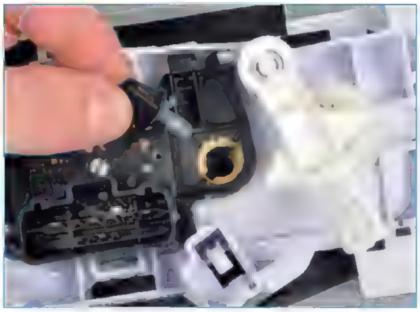
Disconnect the end of the air flow distribution damper actuator rod from the regulator sector.



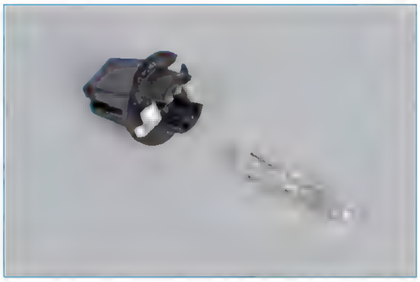
Using a screwdriver, depress the retainer and withdraw the sheath of the air distribution flap actuator rod from the holder.



Remove the heating, ventilation and air conditioning control unit from the instrument panel.



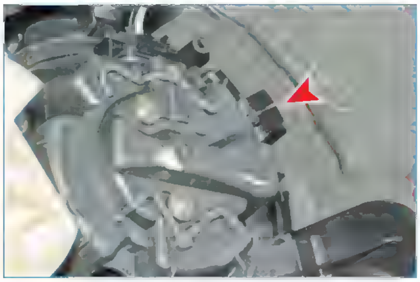
Turn the lamp socket counterclockwise and remove it from the unit.



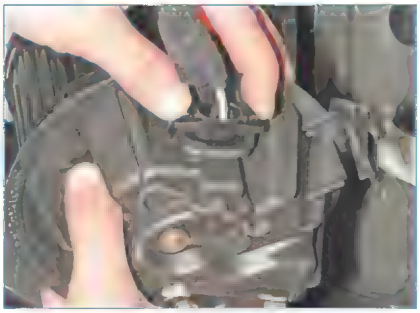
Remove the bayonetless bulb from the socket and replace it with a new W1,2W. Reinstall the heating, ventilation, and air conditioning control unit in the reverse order.

Removing the heater fan

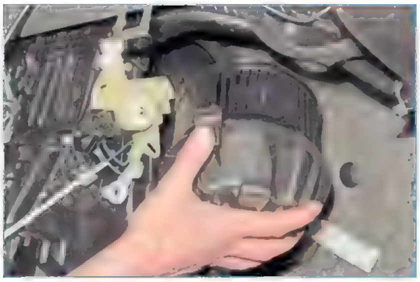
Remove the heater fan for replacement if it fails. Remove the instrument panel (see “Removing the instrument panel,” p. 304).



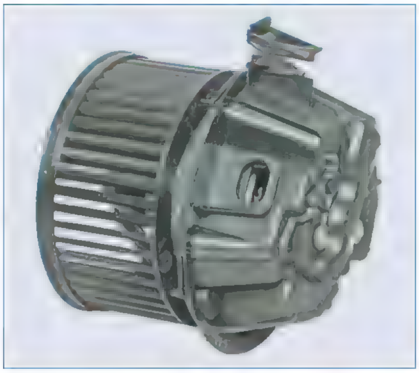
Pressing the plastic retainer, turn the fan counterclockwise a quarter turn......and pull the fan out of the heater housing.



Squeezing the clips, disconnect the wiring connector from the fan motor...



...and remove the heater fan.



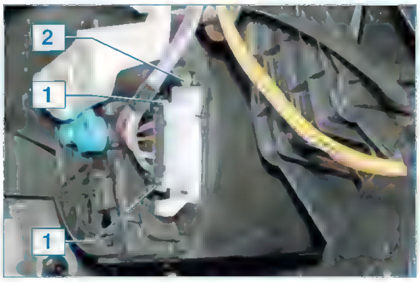
Heater fan

Install the heater fan in reverse order.

Removing the auxiliary heater fan resistor

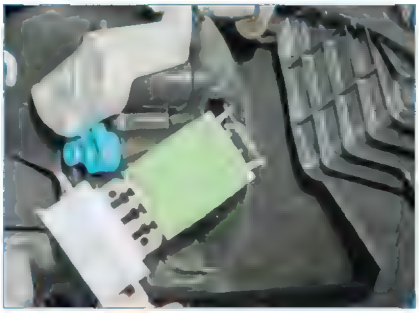
heater

Remove the resistor for replacement if it fails. Disconnect the cable terminal from the battery's negative terminal. For clarity of the operation, we show this with the instrument panel removed.



Pressing the retainers 1 of the wiring harness connector...

...disconnect the connector from the additional blower motor resistor. Use a Torx T-20 wrench to unscrew screw 2 that secures the resistor.

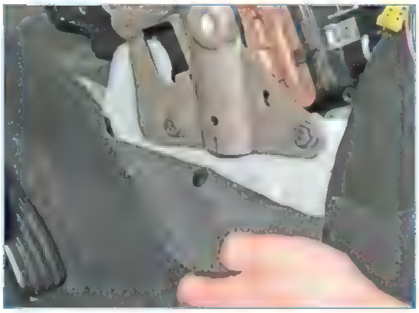


By sliding the resistor up, pull it out of the heater housing.
Install the additional heater blower resistor in the reverse order.

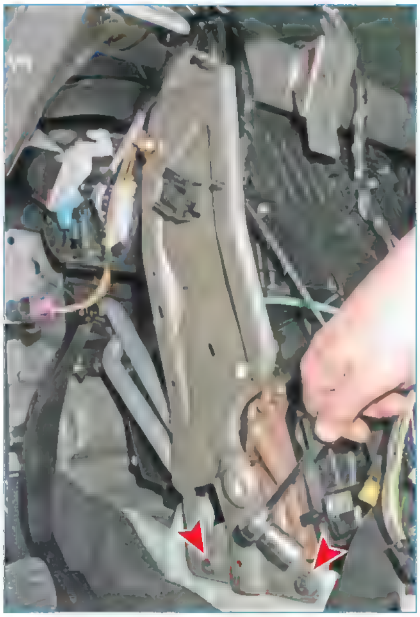
Removing the heater core

Remove the heater core to replace it if you find coolant leaking through the core. Drain the coolant (see “Engine coolant replacement 1.4–1.6 (8V)”, p. 38; “ Engine coolant replacement 1.6 (16V)”, p. 46). Remove the instrument cluster (see “Removing the instrument cluster”, p. 276). Remove the floor tunnel trim (see “Removing the floor tunnel trim”, p. 303).

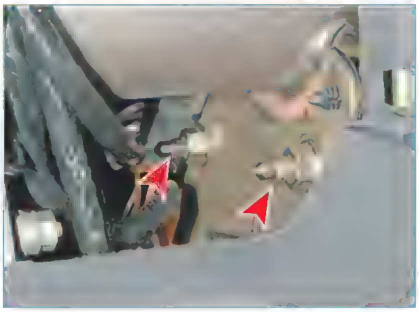
From the left side of the console, remove the carpet-retaining pin that secures the carpeting to the crossbeam bracket...



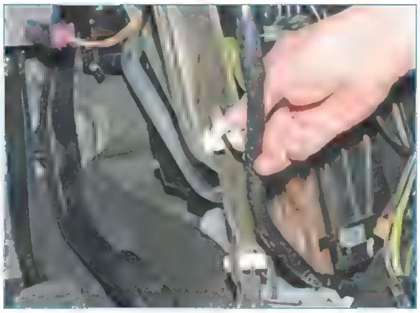
...and fold back the edge of the covering.



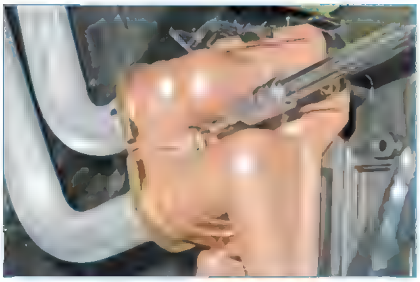
Using a 13 mm socket, loosen the two bolts of the lower mounting of the crossbeam bracket (instrument panel removed for clarity).



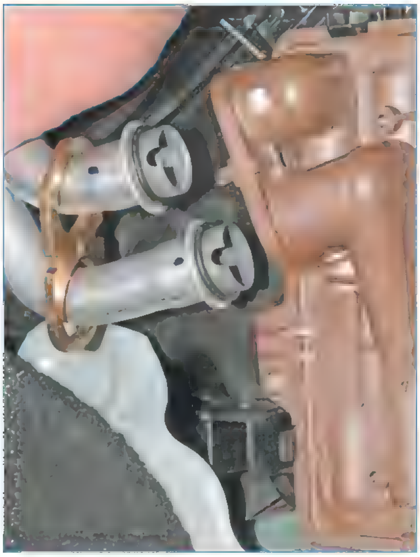
Through the opening in the instrument panel (under the instrument cluster) use a 13 mm wrench to loosen the two nuts of the upper mounting of the crossmember bracket.



Remove the wiring harness from the retainers located on the inner side of the bracket and remove the crossmember bracket.

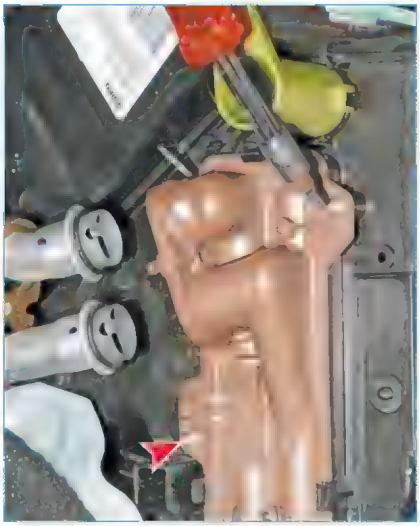


Using a Torx T-20 bit, loosen the screw securing the clamp plate of the heater core tubes.

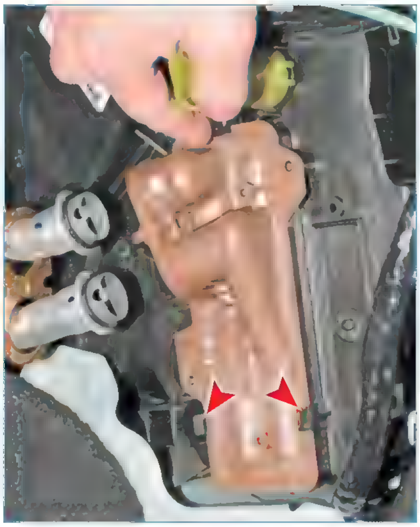


Pull the tubes out of the heater core tank openings.

Rubber sealing rings are fitted on the tube ends.



Using a Torx T-20 bit, loosen the two self-tapping screws securing the heater core.



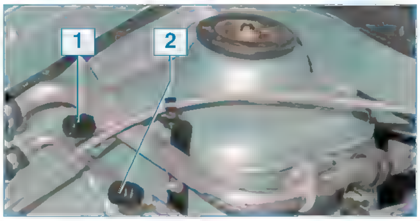
Release the three clips...

...remove the heater core from the heater housing.
Before installing the radiator, replace the rubber sealing rings on the tube fittings.
Install the heater core in the reverse order.

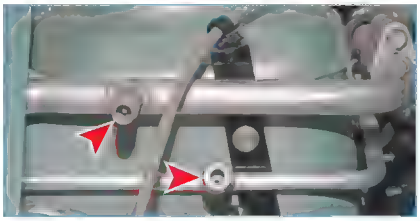
Removing the air conditioning compressor

Remove the air-conditioning compressor for repair or replacement, and also when dismantling the engine.

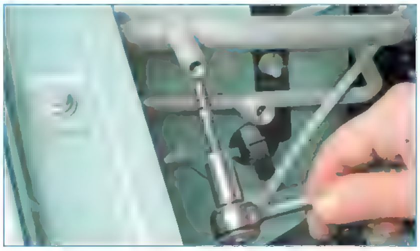
The procedure is shown for the 1.6 (8V) engine. Remove the drive belt for the auxiliary units (see “Replacing the drive belt for auxiliary units on 1.4–1.6 (8V) engines,” p. 32; “Replacing the drive belt for auxiliary units on 1.6 (16V) engines,” p. 41). Remove the engine protection shield (see “Removing the engine protection shield,” p. 283). Before disconnecting the air conditioning system lines, the system must be discharged. When evacuating the system, the refrigerant must be released...



...through the low-pressure 1 and high-pressure 2 service valves, which are sealed with caps.

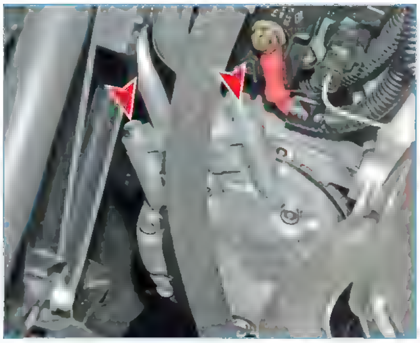


To release refrigerant, press the valve stems with an appropriate tool.
If the valve needs to be replaced...



...with a wrench similar to the metal cap of a tire valve,

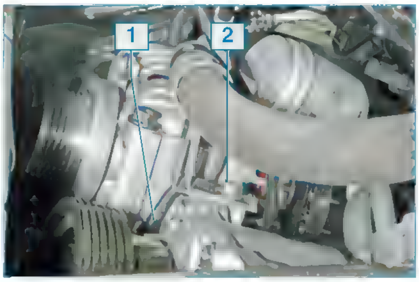
we unscrew the valve from the pipeline fitting.
It is better to evacuate the air conditioning system at a service station equipped with special equipment. The equipment is necessary to observe safety measures and to determine the amount of oil expelled along with the refrigerant.



Using a 10 mm socket, we loosen two bolts...

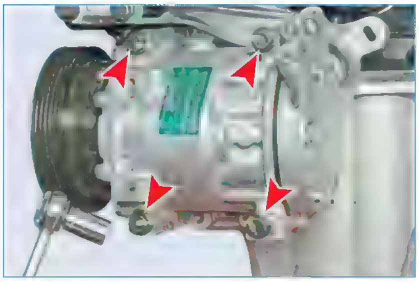
...and disconnect the high- and low-pressure lines from the compressor cover.
To prevent contaminants and moisture from entering the system, close the pipe openings with plugs.

Service port for charging and evacuating refrigerant

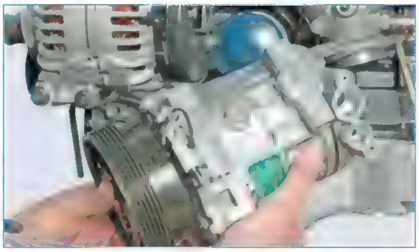


Disconnect the wire terminal 1 from the electromagnet clutch terminal of the compressor, then use a 10 mm socket to loosen bolt 2 securing the high-pressure hose bracket.
The difference in removing the air-conditioning compressor on a vehicle with a 1.6 (16V) engine is...

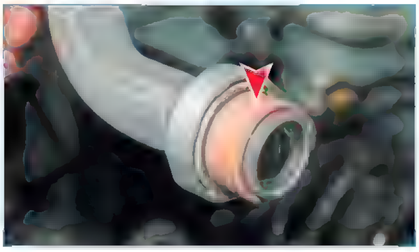
...with a slightly different arrangement of the electromagnetic clutch output.



Using a 13 mm socket, unscrew the four bolts securing the compressor (shown on the removed engine for clarity)...



...and remove the compressor.

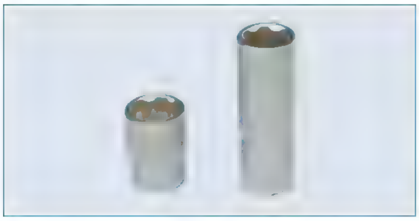


Before installing the compressor, replace the sealing rubber O-rings on the tube fittings with new ones. Install the air-conditioning compressor in reverse order. Recharge the system with refrigerant at a service station and check the air conditioner operation—

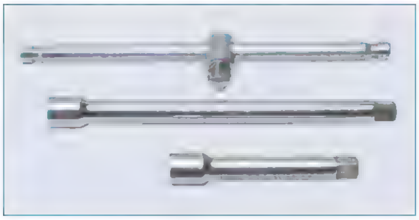
at the maximum blower fan speed. ТИ
of the heater fan rotation.

Tools used for repairs

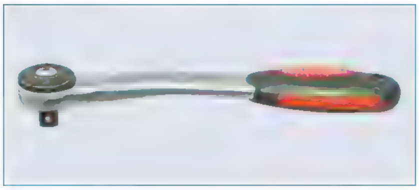
Combination wrench: 6; 7; 8; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 21; 22; 24; 27; 30; 32



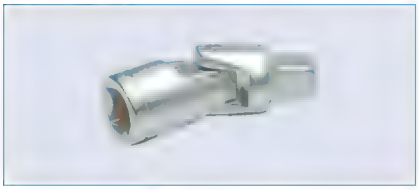
Socket heads: 8; 10; 10 (deep); 11; 12; 13; 13 (deep); 14; 16; 16 (deep); 17; 18; 19; 21 (deep); 22; 24; 27; 30; 32



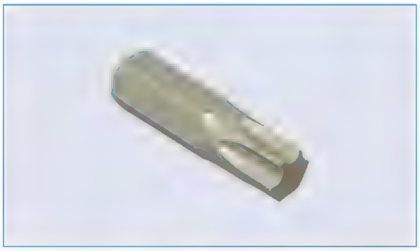
Handles and extensions for sockets



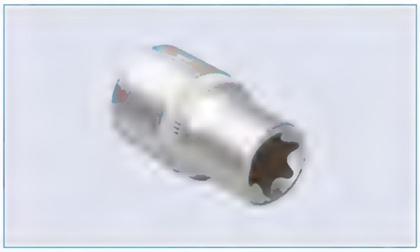
Ratchet



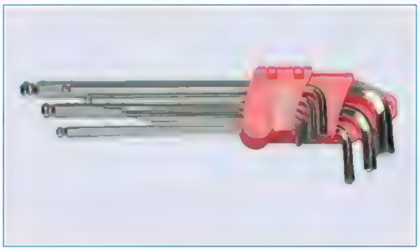
Universal joint



Torx keys: T-20; T-30; T-40; T-50

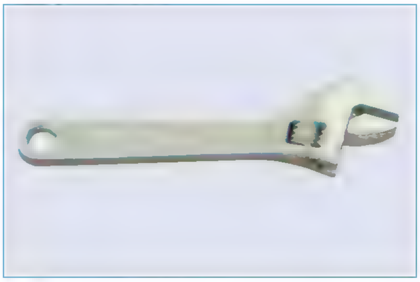


Torx socket: E8; E10; E11; E12; E14; E16

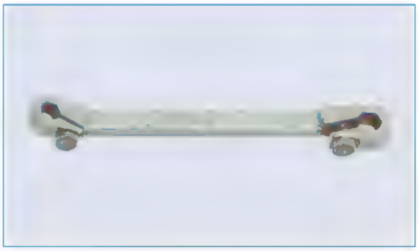


Hex key set

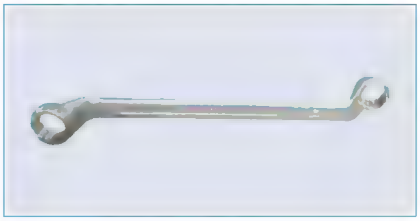
Square drive, 8 mm



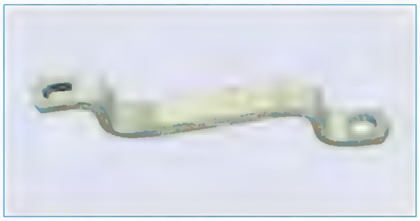
Adjustable wrench 0–19



Wrench for brake hose fittings—size 11



Z-shaped wrench, size 21



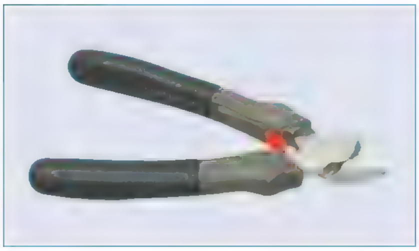
Rear suspension shock absorber rod wrench

Flathead screwdrivers

Phillips screwdrivers

Vise

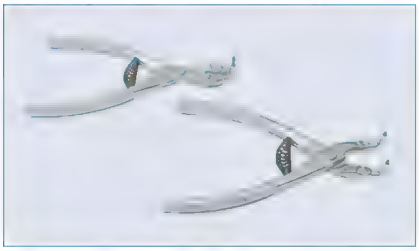
Pliers



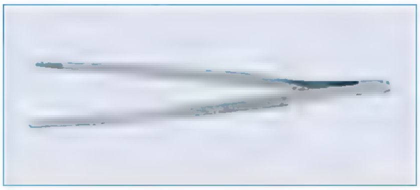
Diagonal
Cutters

Adjustable Pliers

Pliers with Curved Jaws



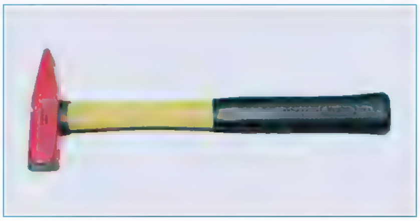
Circlip (snap ring) pliers



Tweezers

Soft-metal drift punch

Chisel

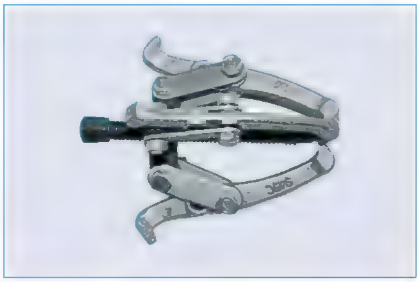


Hammer

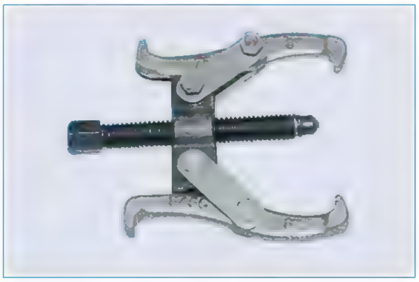
Hammer with plastic head

Small
chisel

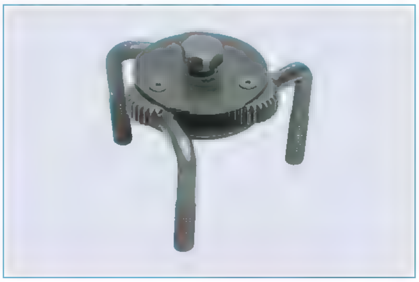
Prying spatula



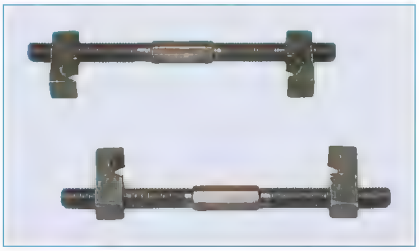
Three-jaw puller



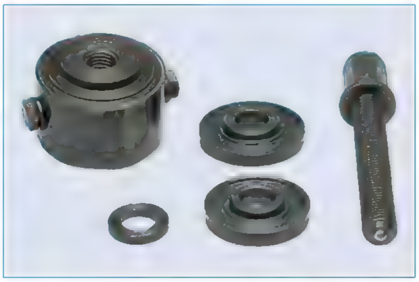
Two-jaw puller



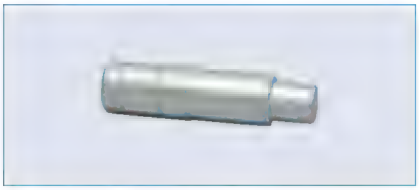
Oil filter wrench



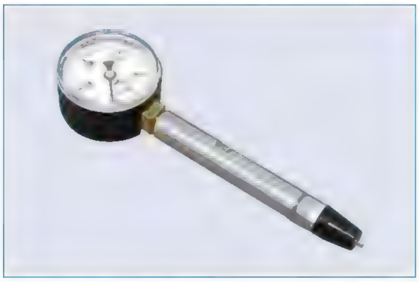
Spring compressors



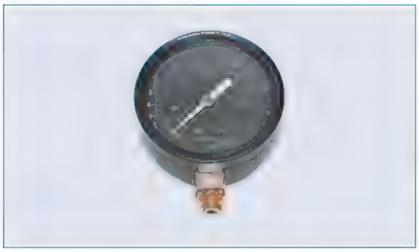
Cup puller for pressing out and pressing in wheel hub bearings



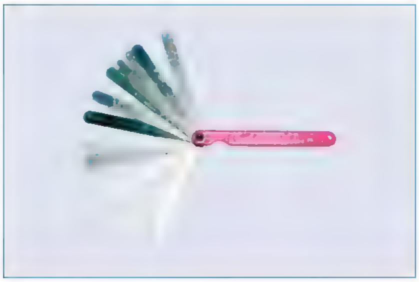
Pilot tool for centering the driven clutch disc



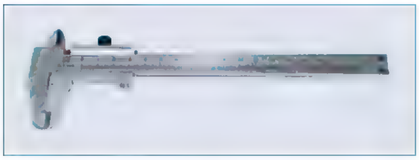
Compression gauge



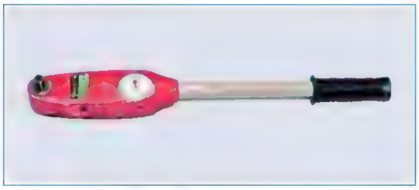
Pressure gauge



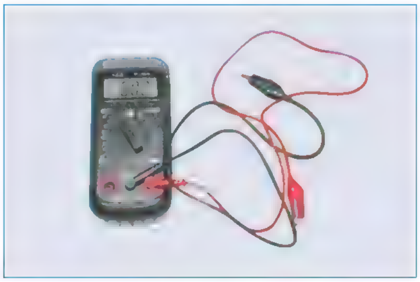
Set of feeler gauges



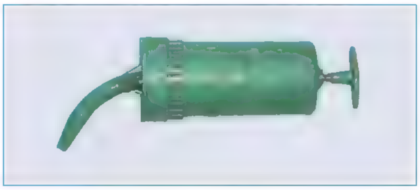
Caliper (vernier caliper)



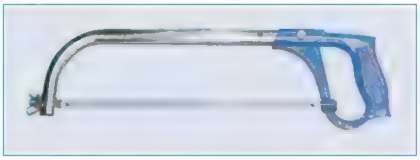
Torque wrench



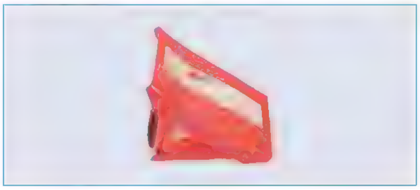
Digital tester (multimeter)



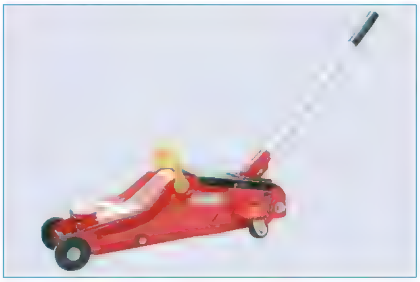
Syringe for filling transmission oil



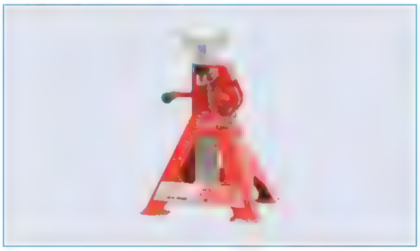
Ключ



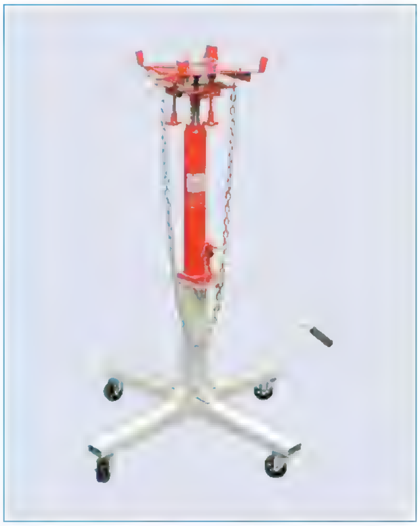
Chock ("shoe")



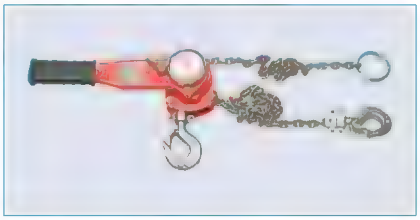
Trolley jack



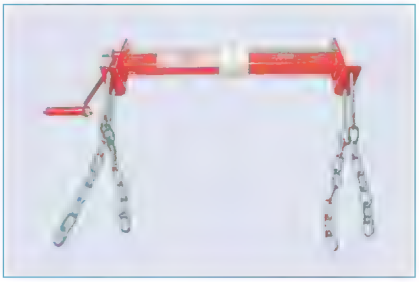
Stand



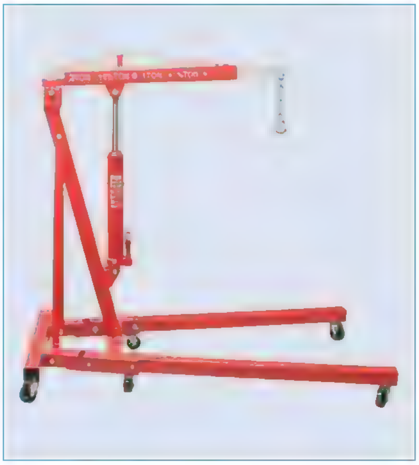
Hydraulic jack stand



Таль



Engine lifting spreader bar



Hydraulic crane

Torque specifications for critical threaded connections

Name of assembly/part	Torque tightening, Н·м
ENGINE 1.4–1.6 (8V)	
Right support mounting bolt	62
Bolt securing the left support bracket to the transmission housing	62
Bolt fastening the left support to the longitudinal member	62
Nut for the left support cushion mounting bolt	105
Nut securing the left support to the bracket	62
Rear support mounting bolt	105
Cylinder head cover fastening bolt Stage 1 Stage 2	 2 10
Drive pulley fastening bolt auxiliary units	30 turn an additional 80±5 °
Flywheel mounting bolt	65
Tensioner housing mounting bolt accessory drive belt	21
Timing belt tensioner mounting nut timing drive	50
M8 bolt for timing cover upper mounting	22
M10 bolt for fastening the timing drive upper cover	44
Bolt for fastening the timing drive lower cover	8
Screw for fastening the cylinder head	20 tighten further by 220±10°
Screw for fastening the engine oil pan to the cylinder block Stage 1 Stage 2	 8 14
Bolt securing the engine oil pan to the clutch housing Stage 1 Stage 3	 8 44
Oil pump mounting bolt	25
Air filter housing mounting screw	25
Self-tapping screw securing the throttle assembly to the intake pipe	10
Bolt/nut securing the intake intake pipe to the cylinder head	25
Bolt/nut for fuel tank mounting	21
Nut securing the canister to the body	21
Screw for mounting the fuel rail	7
Engine coolant temperature sensor	20
Nut securing the radiator bracket cooling system	10
Coolant pump mounting bolt: M6 M8	 10 22
Thermostat housing mounting bolt	10

Name of assembly or part	Torque of tightening, Н·м
Nut securing the exhaust manifold to cylinder head	25
Nut securing the intake pipe flange to the exhaust manifold flange	21
ECU mounting nut	8
Ignition coil mounting screw	15
Position sensor mounting bolt crankshaft	8–10
knock sensor	20–25
Oxygen concentration sensor	45
ENGINE 1.6 (16V)	
bolt securing the right engine mount to the body	62
Bolt securing the left mount bracket to the transmission housing	62
Bolt securing the left mount to the frame rail	62
Nut for the bolt securing the left mount pad	105
Nut securing the left mount to the bracket	62
Rear mount securing bolt	105
Bolt securing the cylinder head cover cylinders	12
Drive pulley mounting bolt auxiliary units	20 turn by 135±15°
Timing pulley mounting nut вала	30 turn further to 84°
Flywheel mounting bolt	65
Nut for the tensioner pulley shaft timing belt drive: Stage 1 Stage 2	 7 27
Bolt for fastening the timing belt idler pulley timing drive	45
Cylinder head fastening bolt	20 turn an additional 240 ±6 °
Engine oil pan fastening bolt: to the engine block: Stage 1 Stage 2 to the clutch housing: Stage 1 Stage 2	 8 14 8 44
Oil pump mounting bolt	25
Bolt securing the oil separator to the cover cylinder head	13
Screw securing the air filter housing	9
Bolt securing the throttle assembly to the intake manifold	13
Bolt securing the intake manifold to the head cover cylinder block	9
Nut for fastening the intake pipe to the cylinder head	21
Bolt/nut for securing the fuel tank	21

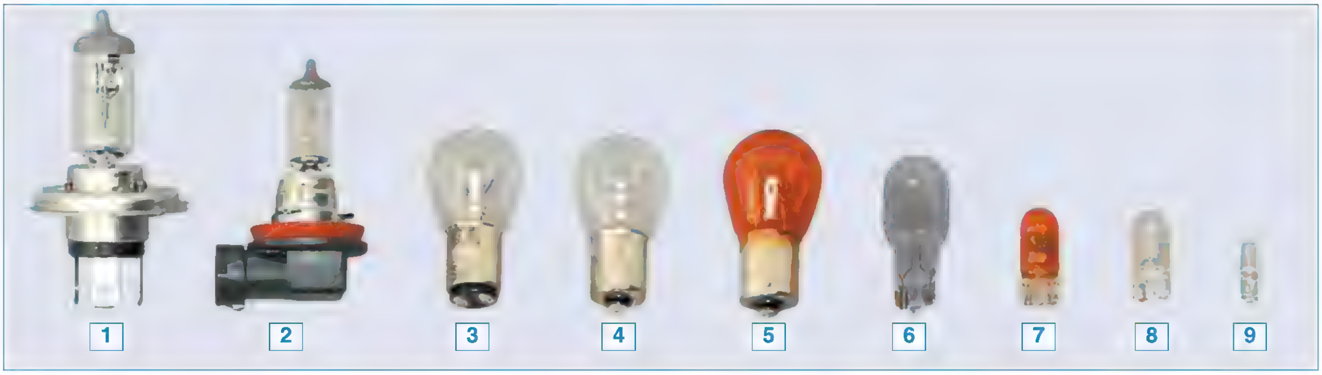
Name of assembly or part	Torque tightening, N·m
Nut securing the adsorber to the body	21
Bolt securing the fuel rail	9
Engine coolant temperature sensor	20
Nut for fastening the cooling system radiator bracket	10
Bolt for fastening the coolant pump fluid: M6 M8	 11 22
Bolt for fastening the thermostat housing	10
Nut for fastening the exhaust manifold to the cylinder head	18
Nut for fastening the inlet pipe flange to the exhaust manifold flange	21
ECU mounting nut	8
Ignition coil mounting bolt	8
Position sensor mounting bolt crankshaft	8–10
Knock sensor	20–25
Oxygen Concentration Sensor	45
CLUTCH	
Bolt/nut for fastening the clutch housing to the engine	44
Bolt for fastening the clutch cover to the flywheel	20
TRANSMISSION	
Bolt for fastening the cover bracket inner joint of the left wheel drive to the transmission housing	25
Nut securing the base of the gear shift lever	15
Drain plug	25
FRONT SUSPENSION	
Bolt for the front and rear subframe mounts to the body	105
Nut of the top mounting of the shock strut to the body	44
Nut for fastening the upper strut mount of the shock absorber	62
Nut of the shock absorber mounting bolt of the strut to the steering knuckle	105
Nut of the clamp connection draw bolt of the steering knuckle and the ball joint stud	62
Nut of the suspension arm mounting bolt to the subframe	105
Nut securing the subframe bracket to the front suspension arm bolt	62
Bolt securing the subframe bracket to the body	21
Nut of the stabilizer bar mounting screw of the anti-roll bar to the suspension arm	14
Front wheel hub bearing nut	280
Wheel mounting bolt	105
REAR SUSPENSION	
Nut of the bolt securing the rear suspension arm to the body bracket	125

Name of assembly, part	Torque tightening, Н·м
Bolt for mounting the suspension arm bracket	62
Rear wheel hub bearing nut	175
Bolt for securing the rear wheel spindle to the rear suspension beam flange	80
Lower shock absorber mounting bolt	105
Upper shock absorber mounting nut	14
STEERING CONTROL	
Steering wheel mounting screw	44
Steering gear housing mounting bolt	105
Steering column bracket mounting nut	21
Tie rod connection to rack	34
Tie rod end locknut	50
Ball joint mounting nut tie rod end	37
power steering pump mounting bolt	21
lower coupling mounting bolt nut intermediate shaft universal joint	21
power steering fluid pressure sensor steering	12
BRAKE SYSTEM	
Pin guide mounting bolt to the steering knuckle	105
Bolt securing the brake disc to the hub	14
Caliper-to-guide-pin mounting bolt	34
Nut securing the master cylinder to the vacuum booster	21
Nut securing the vacuum booster	21
Brake line fitting	14
Bolt securing the rear wheel cylinder	14
Front hose tip mounting of the brake mechanism to the caliper	17
Nut for fastening the pedal bracket of the assembly to the front shield	21
Nut for fastening the lever bracket of the parking brake	21
ELECTRICAL EQUIPMENT	
Battery hold-down bolt	12
Spark plug	25–30
Alternator mounting bolt	21
Starter mounting bolt	44
Airbag mounting screw driver	6,5
BODY	
Bolt/nut for door hinge fastening	28
Bolt fastening the crossmember of the instrument panel support	21
Screw fastening front seats to the body	21
HEATING, VENTILATION AND AIR CONDITIONING SYSTEM	
Bolt for mounting the compressor bracket of the air conditioner to the cylinder block	44
Bolt for mounting the air conditioner compressor	25
Refrigerant pressure sensor	9

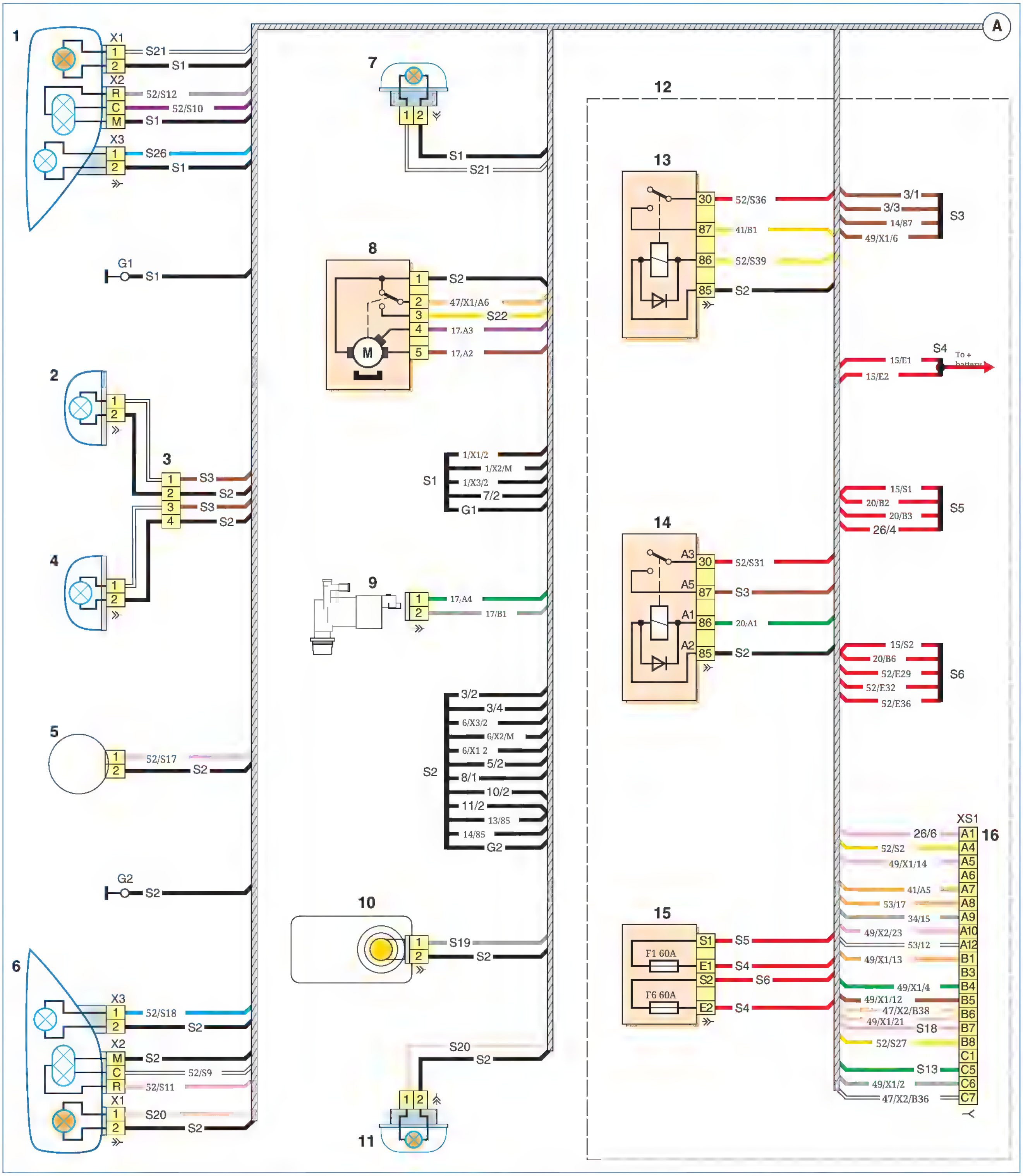
Applicable fuels, lubricants, and operating fluids

Refueling or lubrication location	Quantity	Material name
Fuel tank	50 л	Automotive gasoline AI-92 and AI-95
Engine cooling system, including the system for heating the passenger compartment	5.45 L	GLACEOL RX (type D)
Engine lubrication system 1.4–1.6 (8V) / 1.6 (16V)	3,3/4,75 l	Engine oils with API quality classes: SL; SM and SAE viscosity grades: 5W30; 5W40; 5W50; 0W30; 0W40
Manual transmission housing	3.1 l	Gear oils with API quality classes: GL-4; GL-5 and SAE viscosity grade: 75W80
Brake hydraulic system	0.5 L	Brake fluid, DOT–4
Front-wheel drive joints:		Lubricant MOBIL CVJ 825
outer	294±10 cm³	BLACK STAR or MOBIL
right inner	124±10 cm³	EXF57C
Gearbox control mechanism	–	Lubricant MOLYKOTE 33 “MEDIUM”

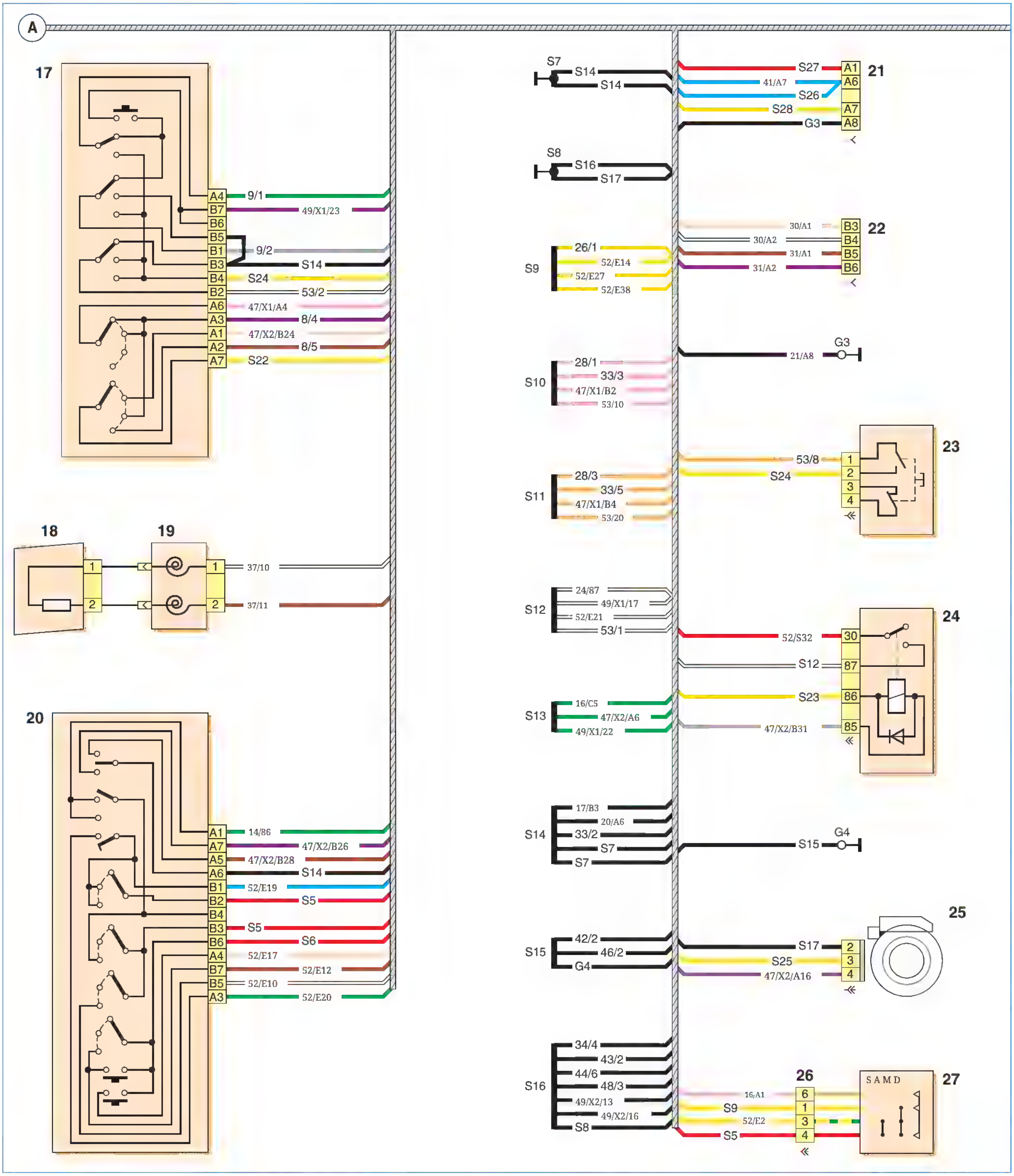
Lamps used in the vehicle



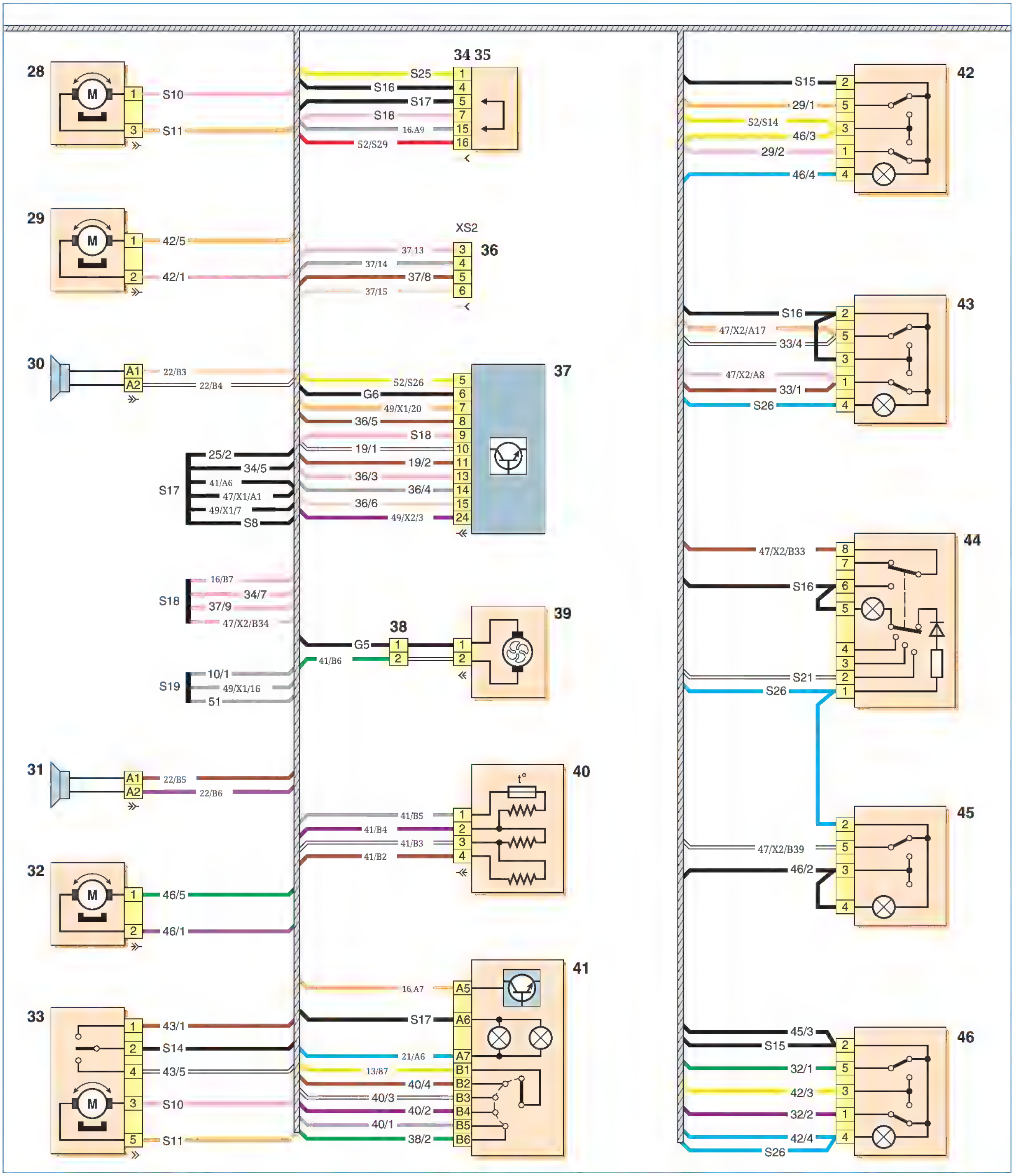
Name	Designation according to EEC	Power, W	Position in photo
Headlamp unit:			
headlight (high/low beam bulb)	H4	60/55	1
front turn signal bulb	PY21W	21	5
parking light bulb	W5W	5	8
fog light bulb	H11	55	2
Side turn signal lamp Logan	WY5W	5	7
Side turn signal lamp Sandero and Sandero Stepway	W5W	5	8
Rear light:			
turn signal lamp	P21W	21	4
parking light and brake light lamp	P21/5W	21/5	3
rear fog lamp	P21W	21	4
reverse light bulb	P21W	21	4
Logan high-mounted brake light bulb	P21W	21	4
high-mounted brake light bulb Sandero and Sandero Stepway	W16W	16	6
license plate light bulb	W5W	5	8
Trunk light lamp	W5W	5	8
Interior dome light lamp	W5W	5	8
Reading/map light	W5W	5	8
Glove compartment light lamp	W5W	5	8
Cigarette lighter illumination lamp	W1.2W	1,2	9
Control unit backlight lamp for ventilation, heating, and air conditioning	W1,2W	1,2	9


A
1
X1
1
2
S21
S1
X2
R
C
M
52/S12
52/S10
S1
X3
1
2
S26
S1
G1
S1
2
1
2
3
1
2
3
4
S3
S2
S3
S2
4
1
2
5
1
2
52/S17
S2
G2
S2
6
X3
1
2
52/S18
S2
X2
M
C
R
S2
52/S9
52/S11
X1
1
2
S20
S2
7
1
2
S1
S21
8
M
1
2
3
4
5
S2
47/X1/A6
S22
17/A3
17/A2
S1
1/X1/2
1/X2/M
1/X3/2
7/2
G1
9
1
2
17/A4
17/B1
S2
3/2
3/4
6/X3/2
6/X2/M
6/X1 2
5/2
8/1
10/2
11/2
13/85
14/85
G2
10
1
2
S19
S2
11
1
2
S20
S2
12
13
30
87
86
85
52/S36
41/B1
52/S39
S2
3/1
3/3
14/87
49/X1/6
S3
S4
To + battery
15/E1
15/E2
15/S1
20/B2
20/B3
26/4
S5
14
A3
A5
A1
A2
30
87
86
85
52/S31
S3
20/A1
S2
15/S2
20/B6
52/E29
52/E32
52/E36
S6
15
F1 60A
F6 60A
S1
E1
S2
E2
S5
S4
S6
S4
XS1
16
A1
A4
A5
A6
A7
A8
A9
A10
A12
B1
B3
B4
B5
B6
B7
B8
C1
C5
C6
C7
26/6
52/S2
49/X1/14
41/A5
53/17
34/15
49/X2/23
53/12
49/X1/13
49/X1/4
49/X1/12
47/X2/B38
49/X1/21
S18
52/S27
S13
49/X1/2
47/X2/B36

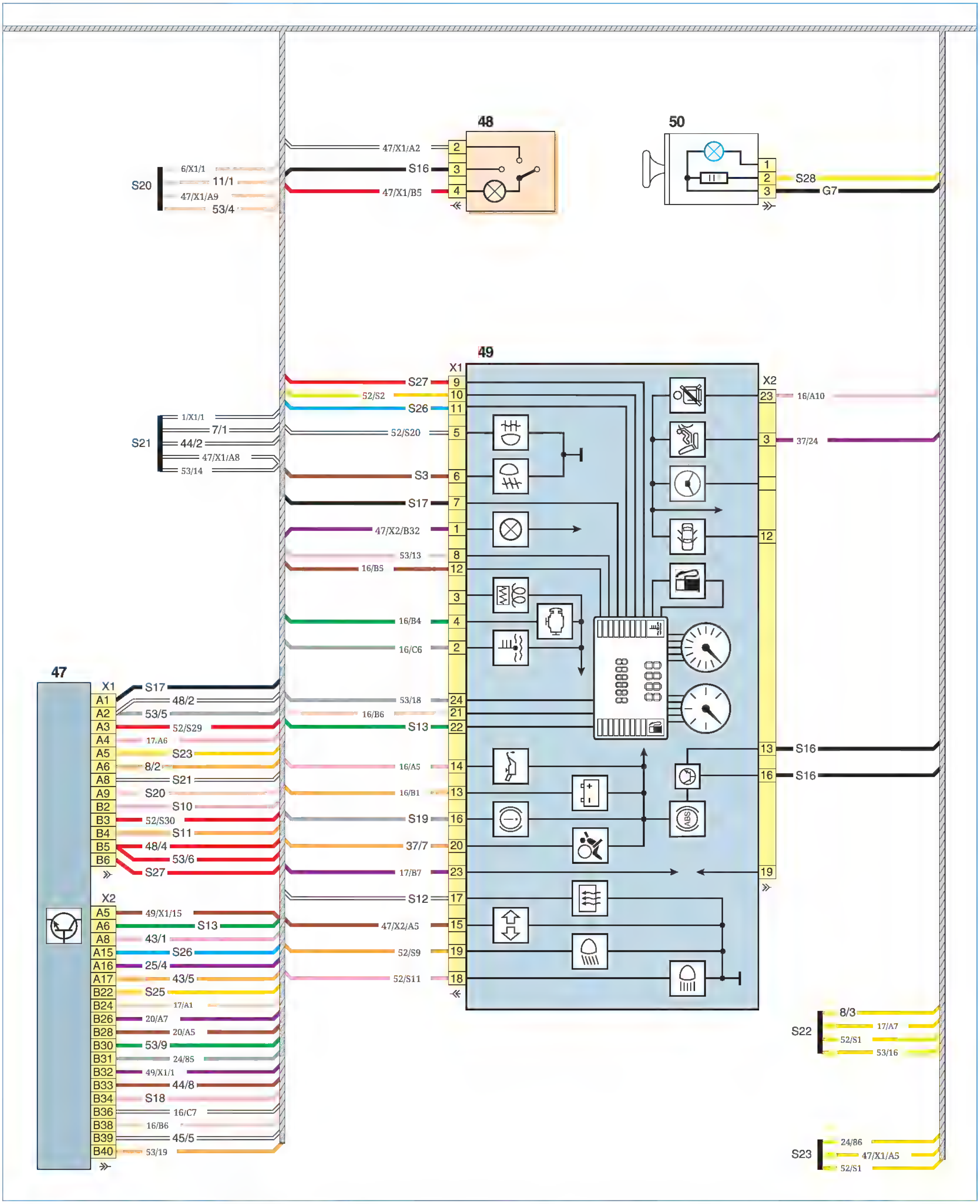
Front body wiring harness connection diagram for Logan (options not included in this diagram, see Sandero diagrams): A – point where the harness passes from the engine compartment into the cabin; **1** – right headlight assembly; **2** – right fog lamp; **3** – connector to the fog lamp wiring harness; **4** – left fog lamp; **5** – horn; **6** – left headlight assembly; **7** – right side turn signal; **8** – windshield wiper; **9** – windshield washer; **10** – brake fluid level sensor; **11** – left side turn signal; **12** – relay and fuse block in the engine compartment; **13** – fog lamp relay; **14** – heater fan relay; **15** – fuses in the engine compartment relay and fuse block; **16** – connector to the engine wiring harness;


A
17
A4
B7
B6
B5
B1
B3
B4
B2
A6
A3
A1
A2
A7
9/1
49/X1/23
9/2
S14
S24
53/2
47/X1/A4
8/4
47/X2/B24
8/5
S22
18
19
1
2
37/10
37/11
20
A1
A7
A5
A6
B1
B2
B4
B3
B6
A4
B7
B5
A3
14/86
47/X2/B26
47/X2/B28
S14
52/E19
S5
S5
S6
52/E17
52/E12
52/E10
52/E20
S7
S14
S14
S8
S16
S17
S9
26/1
52/E14
52/E27
52/E38
S10
28/1
33/3
47/X1/B2
53/10
S11
28/3
33/5
47/X1/B4
53/20
S12
24/87
49/X1/17
52/E21
53/1
S13
16/C5
47/X2/A6
49/X1/22
S14
17/B3
20/A6
33/2
S7
S7
S15
42/2
46/2
G4
S16
34/4
43/2
44/6
48/3
49/X2/13
49/X2/16
S8
S27
41/A7
S26
S28
G3
A1
A6
A7
A8
21
30/A1
30/A2
31/A1
31/A2
B3
B4
B5
B6
22
G3
21/A8
53/8
S24
1
2
3
4
23
52/S32
S12
S23
47/X2/B31
30
87
86
85
24
G4
S15
25
S17
S25
47/X2/A16
2
3
4
26
16/A1
S9
52/E2
S5
6
1
3
4
27
SAMD

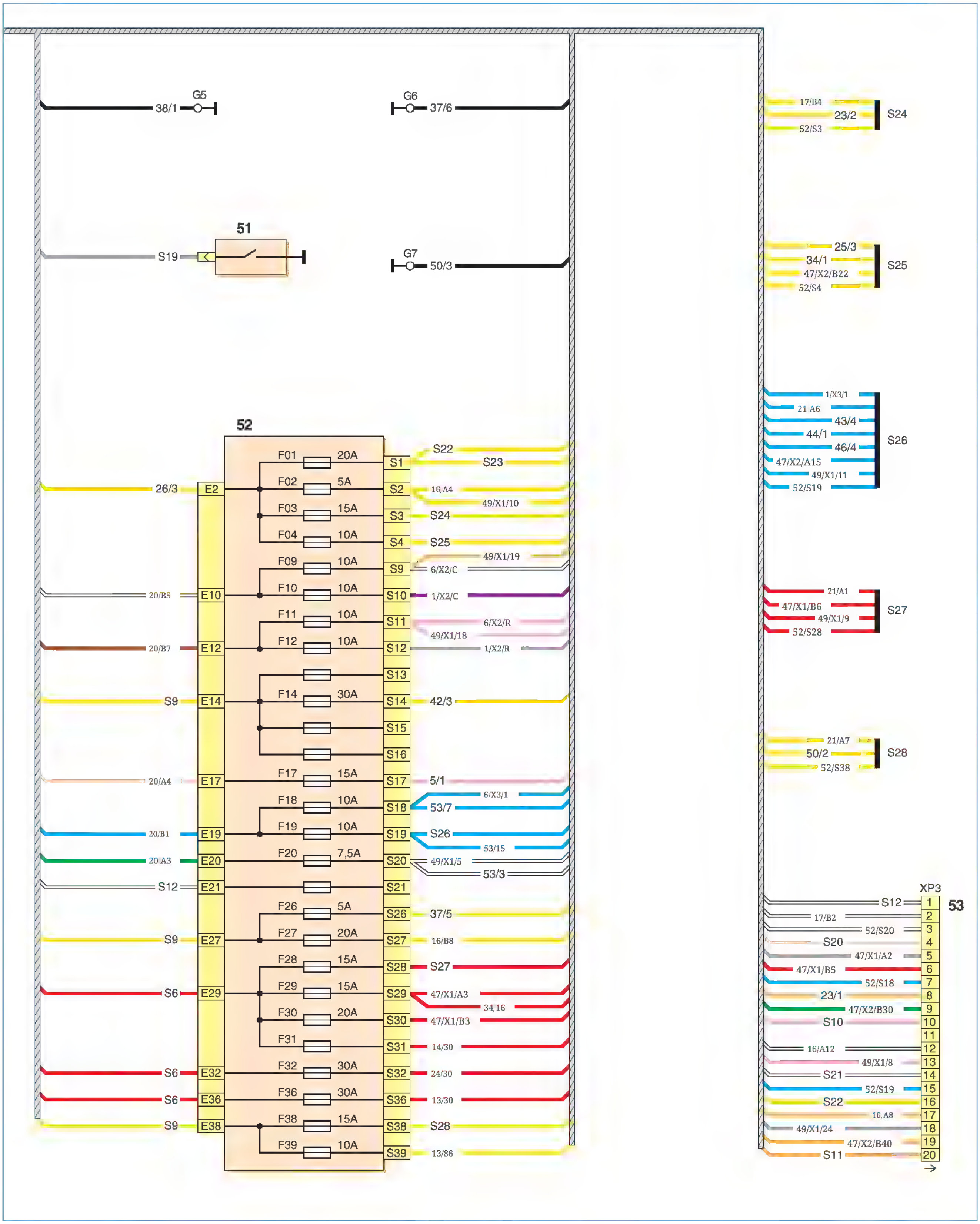
17 – right steering column switch; **18** – driver airbag; **19** – spiral cable; **20** – left steering column switch;**21**, **22** – audio system connection connector; **23** – brake pedal position sensor and brake light switch; **24** – rear window defogger relay; **25** – immobilizer coil; **26** – connector to the ignition switch wiring harness; **27** – ignition switch; **28** – right front door lock actuator; **29** – right front power window; **30** – right front speaker; **31** – left front speaker; **32** – left front power window; **33** – left front door lock actuator; **34** – diagnostic connector;


28
M
1
3
S10
S11
29
42/5
42/1
2
30
A1
A2
22/B3
22/B4
S17
25/2
34/5
41/A6
47/X1/A1
49/X1/7
S8
S18
16/B7
34/7
37/9
47/X2/B34
S19
10/1
49/X1/16
51
31
22/B5
22/B6
32
46/5
46/1
33
43/1
S14
43/5
34 35
S25
S16
S17
S18
16/A9
52/S29
4
5
7
15
16
XS2
36
37 13
37/14
37/8
37/15
6
37
52/S26
G6
49/X1/20
36/5
19/1
19/2
36/3
36/4
36/6
49/X2/3
8
9
10
11
12
13
14
24
38
G5
41/B6
39
40
t°
41/B5
41/B4
41/B3
41/B2
41
16/A7
21/A6
13/87
40/4
40/3
40/2
40/1
38/2
A5
A6
A7
B1
B2
B3
B4
B5
B6
42
S15
29/1
52/S14
46/3
29/2
46/4
43
47/X2/A17
33/4
47/X2/A8
33/1
S26
44
47/X2/B33
S21
45
47/X2/B39
46/2
46
45/3
32/1
42/3
32/2
42/4

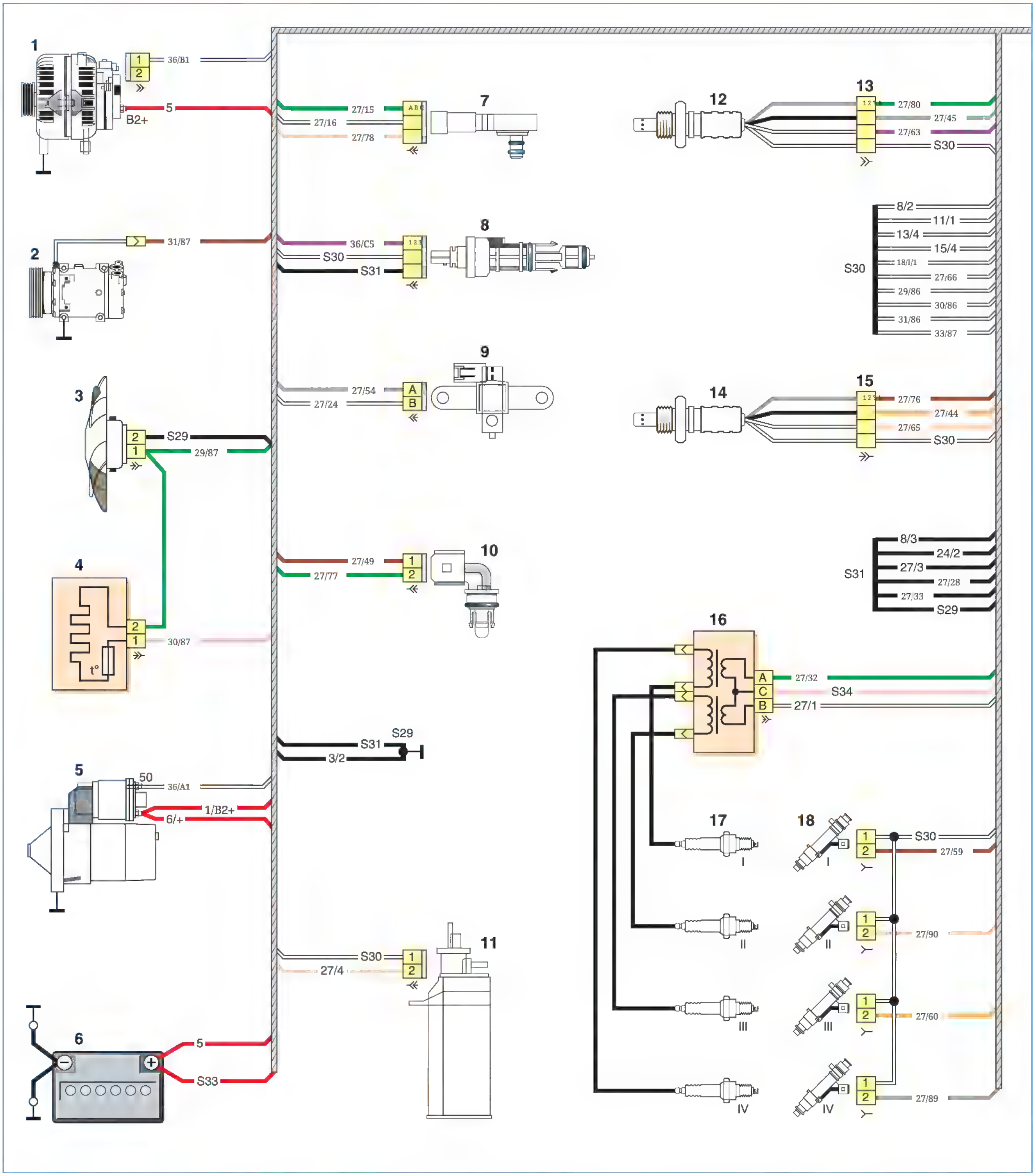
35 – diagnostic connector cover with jumper; **36** – connection block with wiring harness for the front passenger airbag and glovebox illumination; **37** – airbag control unit; **38** – connection block with wiring harness for the heater fan; **39** – heater fan; **40** – auxiliary resistors block for the heater fan; **41** – ventilation, heating and air conditioning control unit; **42** – right front door window switch; **43** – central locking switch; **44** – hazard warning switch; **45** – rear window defogger switch; **46** – left front door window switch;


48
50
S20
6/X1/1
11/1
47/X1/A9
53/4
47/X1/A2
S16
47/X1/B5
S28
G7
49
X1
X2
S27
52/S2
S26
52/S20
S3
S17
47/X2/B32
53/13
16/B5
16/B4
16/C6
53/18
16/B6
S13
16/A5
16/B1
S19
37/7
17/B7
S12
47/X2/A5
52/S9
52/S11
16/A10
37/24
S16
S21
1/X1/1
7/1
44/2
47/X1/A8
53/14
47
S17
48/2
53/5
52/S29
17/A6
S23
8/2
S21
S20
S10
52/S30
S11
48/4
53/6
S27
49/X1/15
S13
43/1
S26
25/4
43/5
S25
17/A1
20/A7
20/A5
53/9
24/85
49/X1/1
44/8
S18
16/C7
16/B6
45/5
53/19
A1
A2
A3
A4
A5
A6
A8
A9
B2
B3
B4
B5
B6
A15
A16
A17
B22
B24
B26
B28
B30
B31
B32
B33
B34
B36
B38
B39
B40
S22
8/3
17/A7
52/S1
53/16
S23
24/86
47/X1/A5
52/S1
ABS

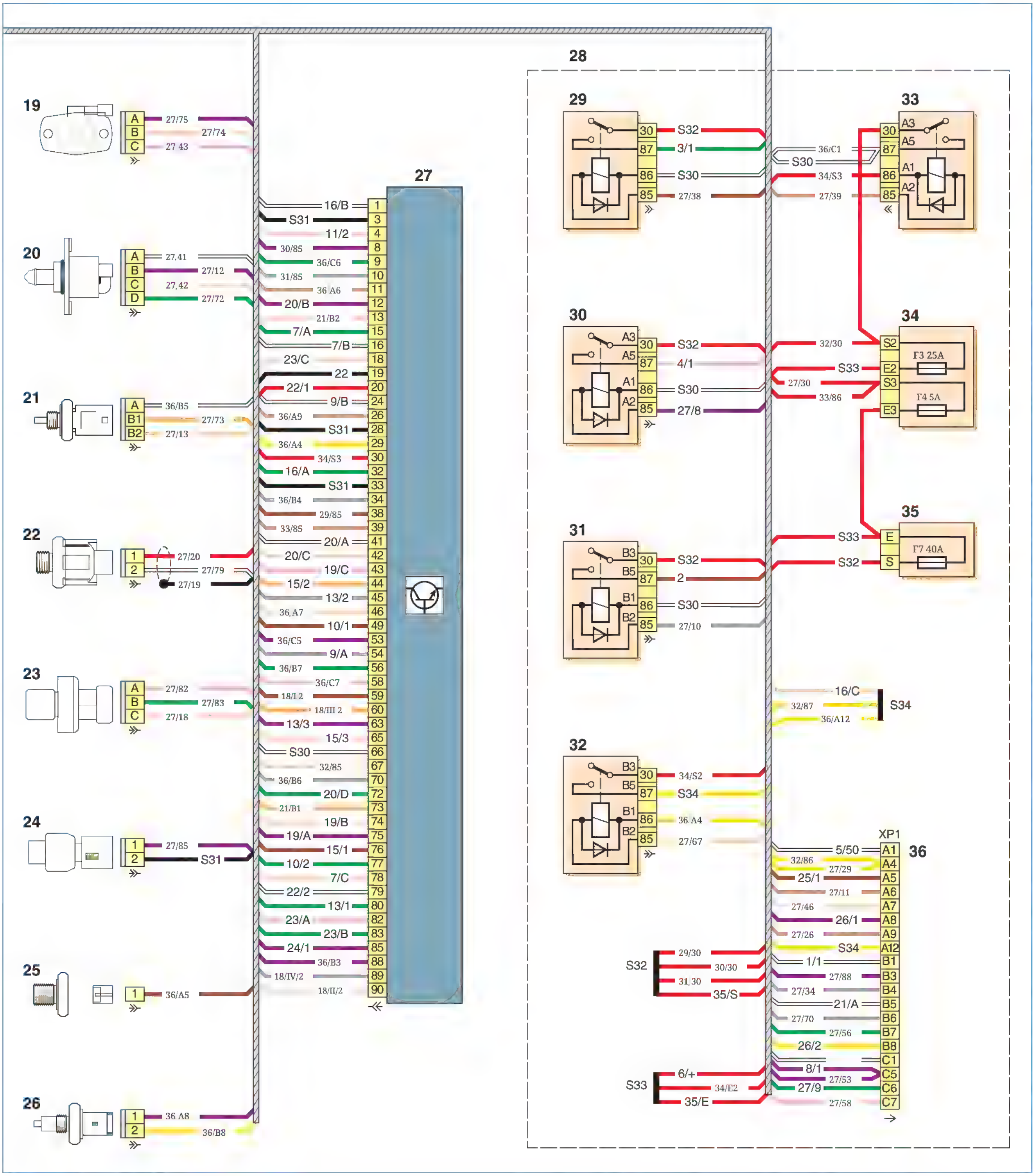
47 – switching unit; **48** – cabin light fixture; **49** – instrument cluster; **50** – cigarette lighter; **51** – parking brake engaged and brake system fault indicator switch;


G5
38/1
G6
37/6
51
S19
G7
50/3
52
F01 20A
F02 5A
F03 15A
F04 10A
F09 10A
F10 10A
F11 10A
F12 10A
F14 30A
F17 15A
F18 10A
F19 10A
F20 7,5A
F26 5A
F27 20A
F28 15A
F29 15A
F30 20A
F31
F32 30A
F36 30A
F38 15A
F39 10A
E2
E10
E12
E14
E17
E19
E20
E21
E27
E29
E32
E36
E38
26/3
20/B5
20/B7
S9
20/A4
20/B1
20/A3
S12
S6
S1
S2
S3
S4
S9
S10
S11
S12
S13
S14
S15
S16
S17
S18
S19
S20
S21
S26
S27
S28
S29
S30
S31
S32
S36
S38
S39
S22
S23
16/A4
49/X1/10
S24
S25
49/X1/19
6/X2/C
1/X2/C
6/X2/R
49/X1/18
1/X2/R
42/3
5/1
6/X3/1
53/7
S26
53/15
49/X1/5
53/3
37/5
16/B8
S27
47/X1/A3
34/16
47/X1/B3
14/30
24/30
13/30
S28
13/86
17/B4
23/2
52/S3
S24
25/3
34/1
47/X2/B22
52/S4
S25
1/X3/1
21/A6
43/4
44/1
46/4
47/X2/A15
49/X1/11
52/S19
S26
21/A1
47/X1/B6
49/X1/9
52/S28
S27
21/A7
50/2
52/S38
S28
XP3
53
S12
17/B2
52/S20
S20
47/X1/A2
47/X1/B5
52/S18
23/1
47/X2/B30
S10
16/A12
49/X1/8
S21
52/S19
S22
16/A8
49/X1/24
47/X2/B40
S11
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

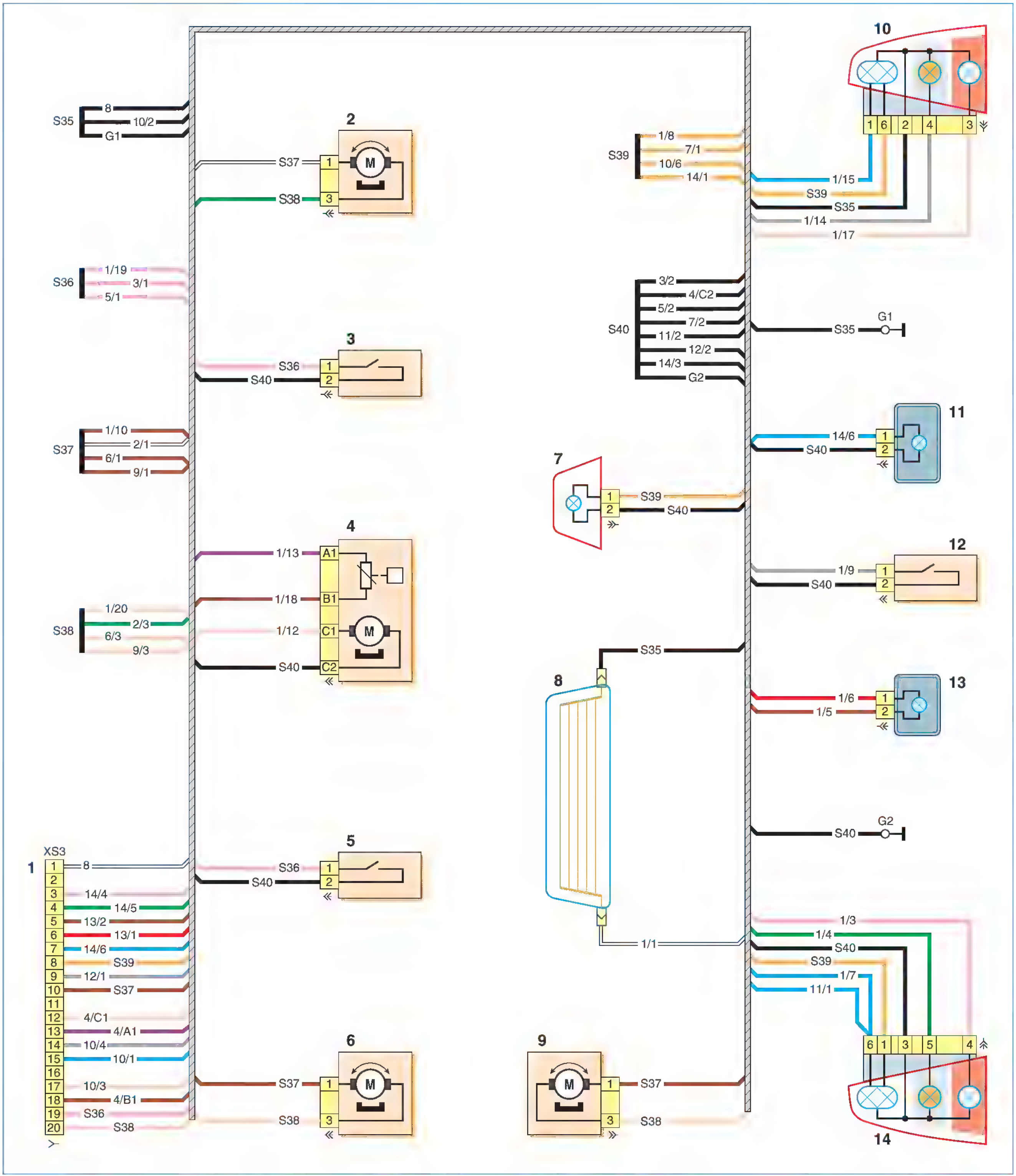
52 – fuse block in the passenger compartment; **53** – connector to the rear body wiring harness


1
1
2
36/B1
5
B2+
2
31/87
3
2
1
S29
29/87
4
2
1
30/87
t°
5
50
36/A1
1/B2+
6/+
6
5
S33
7
27/15
27/16
27/78
A B C
8
36/C5
S30
S31
1 2 3
9
27/54
27/24
A
B
10
27/49
27/77
1
2
S31
S29
3/2
11
S30
27/4
1
2
12
13
1 2 3
27/80
27/45
27/63
S30
S30
8/2
11/1
13/4
15/4
18/1/1
27/66
29/86
30/86
31/86
33/87
14
15
1 2 3
27/76
27/44
27/65
S30
S31
8/3
24/2
27/3
27/28
27/33
S29
16
A
C
B
27/32
S34
27/1
17
I
II
III
IV
18
I
II
III
IV
1
2
S30
27/59
27/90
27/60
27/89

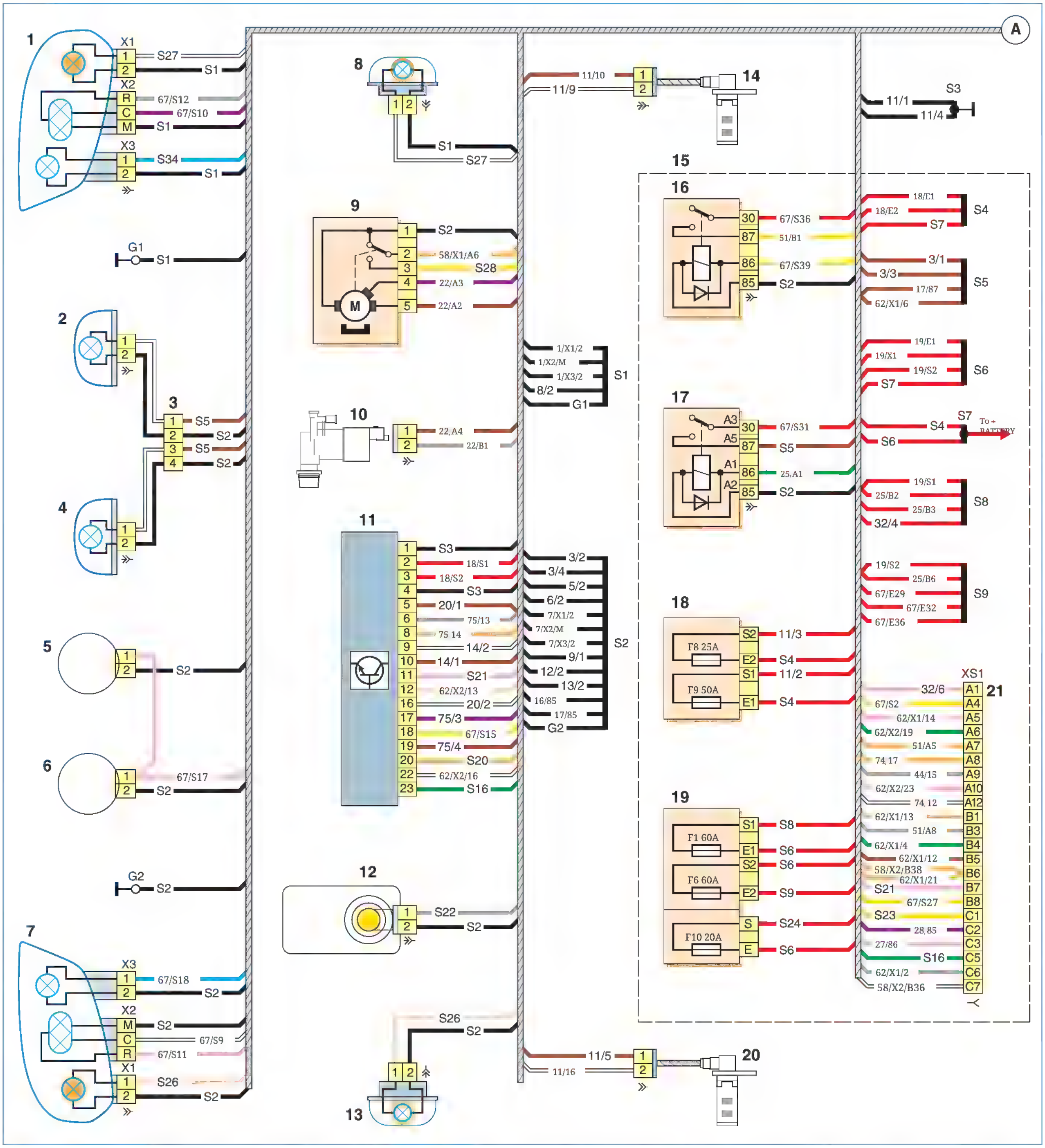
Wiring harness diagram for 1.4–1.6 (8V) engine: **1** – alternator; **2** – air conditioning compressor; **3** – cooling fan; **4** – auxiliary resistor; **5** – starter; **6** – battery; **7** – intake absolute pressure sensor; **8** – vehicle speed sensor; **9** – crankshaft position sensor; **10** – intake air temperature sensor; **11** – evaporative purge valve; **12** – oxygen sensor (control); **13** – connector to the control oxygen sensor harness; **14** – oxygen sensor (diagnostic); **15** – connector to the diagnostic oxygen sensor harness; **16** – ignition coil; **17** – spark plugs; **18** – fuel injectors; **19** – throttle position sensor;


19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
XP1
F3 25A
F4 5A
F7 40A
S30
S31
S32
S33
S34

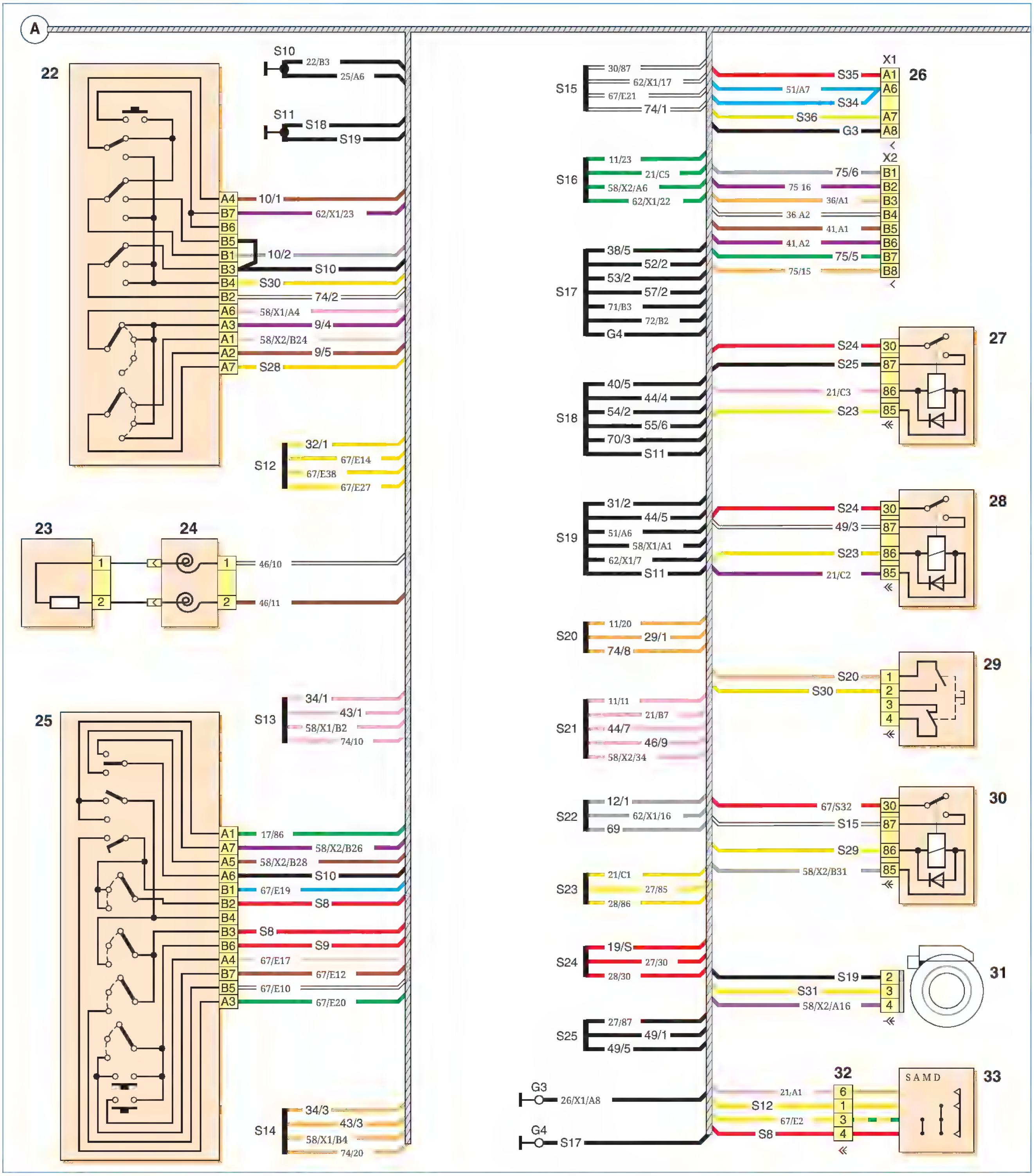
20 – idle speed regulator; **21** – engine coolant temperature sensor; **22** – knock sensor; **23** – refrigerant pressure sensor; **24** – power steering system pressure sensor; **25** – low oil pressure sensor; **26** – reverse light switch; **27** – engine control unit (controller); **28** – fuse and relay box in the engine compartment; **29** – high-speed cooling fan relay; **30** – low-speed cooling fan relay; **31** – air conditioning compressor relay; **32** – fuel pump relay and ignition coils; **33** – main relay; **34**, **35** – fuses in the engine compartment relay and fuse block; **36** – connector to the front body wiring harness


10
S35
8
10/2
G1
2
S37
1
S38
3
S39
1/8
7/1
10/6
14/1
1/15
S39
S35
1/14
1/17
1
6
2
4
3
S36
1/19
3/1
5/1
3
S36
S40
1
2
S40
3/2
4/C2
5/2
7/2
11/2
12/2
14/3
G2
G1
S35
11
14/6
S40
S37
1/10
2/1
6/1
9/1
7
S39
S40
4
1/13
A1
1/18
B1
1/12
C1
S40
C2
M
12
1/9
S40
S38
1/20
2/3
6/3
9/3
S35
8
13
1/6
1/5
G2
S40
XS3
1
5
S36
S40
8
14/4
14/5
13/2
13/1
14/6
S39
12/1
S37
4/C1
4/A1
10/4
10/1
10/3
4/B1
S36
S38
1/1
1/3
1/4
S40
S39
1/7
11/1
6
9
S37
S38
S37
S38
14

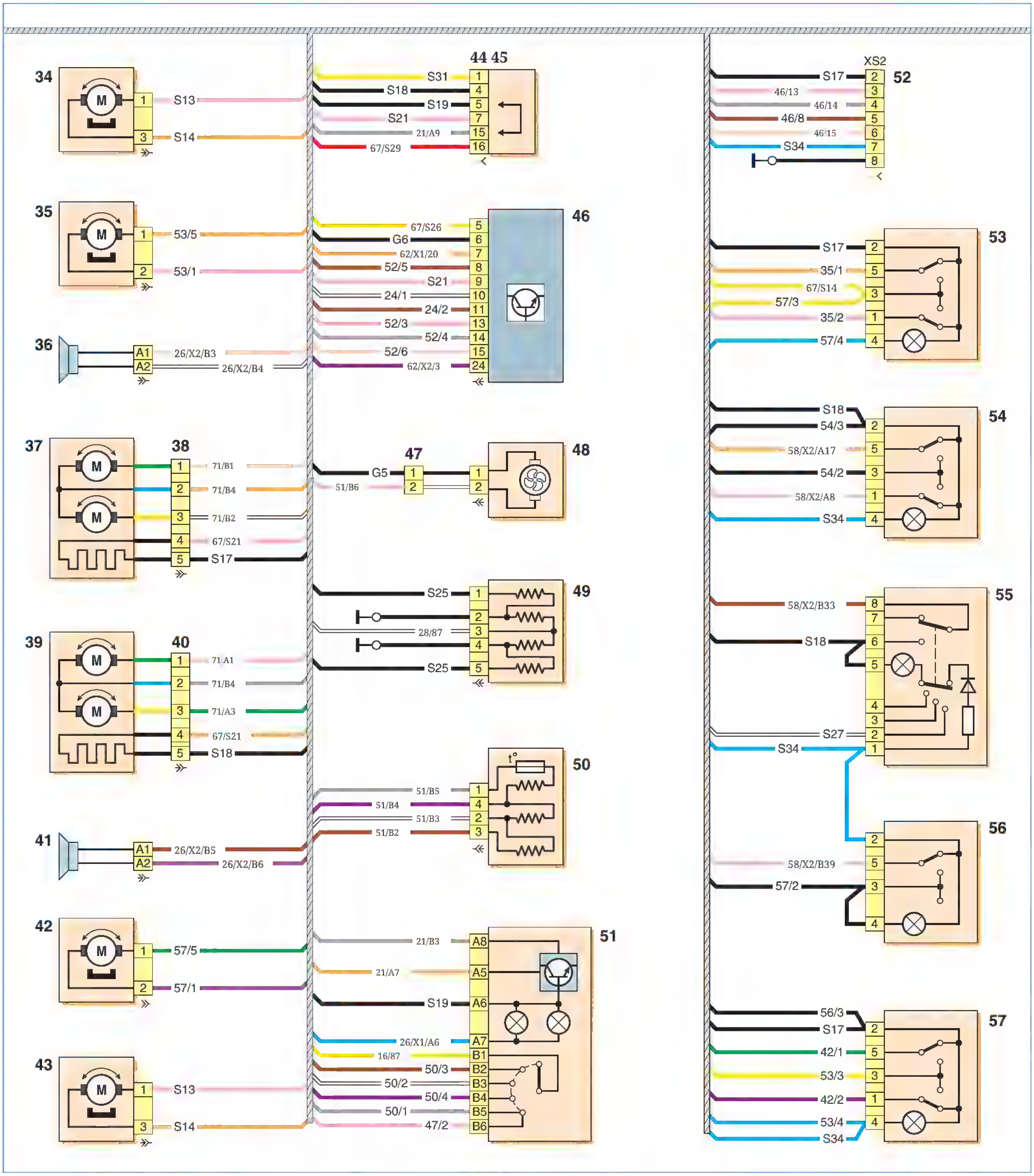
Wiring diagram of the rear body wiring harness of the Logan: 1 – connector to the front body harness; **2** – actuator for the right rear door lock; **3** – interior light door switch at the right front door; **4** – fuel module; **5** – interior light door switch at the left front door; **6** – actuator for the left rear door lock; **7** – additional brake light;**8** – rear window heating element; **9** – actuator for the trunk lid lock; **10** – right rear lamp; **11** – license plate light; **12** – trunk light switch; **13** – trunk interior light; **14** – left rear lamp


A
1
X1
1
2
S27
S1
X2
R
C
M
67/S12
67/S10
S1
X3
1
2
S34
S1
G1
S1
2
1
2
3
1
2
3
4
S5
S2
S5
S2
4
1
2
5
1
2
S2
6
1
2
67/S17
S2
G2
S2
7
X3
1
2
67/S18
S2
X2
M
C
R
S2
67/S9
67/S11
X1
1
2
S26
S2
8
1
2
S1
S27
9
1
2
3
4
5
M
S2
58/X1/A6
S28
22/A3
22/A2
10
1
2
22/A4
22/B1
11
1
2
3
4
5
6
8
9
10
11
12
16
17
18
19
20
22
23
S3
18/S1
18/S2
S3
20/1
75/13
75/14
14/2
14/1
S21
62/X2/13
20/2
75/3
67/S15
75/4
S20
62/X2/16
S16
12
1
2
S22
S2
13
1
2
S26
S2
1/X1/2
1/X2/M
1/X3/2
8/2
G1
S1
3/2
3/4
5/2
6/2
7/X1/2
7/X2/M
7/X3/2
9/1
12/2
13/2
16/85
17/85
G2
S2
11/10
11/9
1
2
14
11/5
11/16
1
2
20
S3
11/1
11/4
15
16
30
87
86
85
67/S36
51/B1
67/S39
S2
17
A3
A5
A1
A2
30
87
86
85
67/S31
S5
25/A1
S2
18
F8 25A
F9 50A
S2
E2
S1
E1
11/3
S4
11/2
S4
19
F1 60A
F6 60A
F10 20A
S1
E1
S2
E2
S
E
S8
S6
S6
S9
S24
S6
18/E1
18/E2
S7
S4
3/1
3/3
17/87
62/X1/6
S5
19/E1
19/X1
19/S2
S7
S6
S4
S7
To + BATTERY
S6
19/S1
25/B2
25/B3
32/4
S8
19/S2
25/B6
67/E29
67/E32
67/E36
S9
XS1
21
32/6
67/S2
62/X1/14
62/X2/19
51/A5
74/17
44/15
62/X2/23
74/12
62/X1/13
51/A8
62/X1/4
62/X1/12
58/X2/B38
62/X1/21
S21
67/S27
S23
28/85
27/86
S16
62/X1/2
58/X2/B36
A1
A4
A5
A6
A7
A8
A9
A10
A12
B1
B3
B4
B5
B6
B7
B8
C1
C2
C3
C5
C6
C7

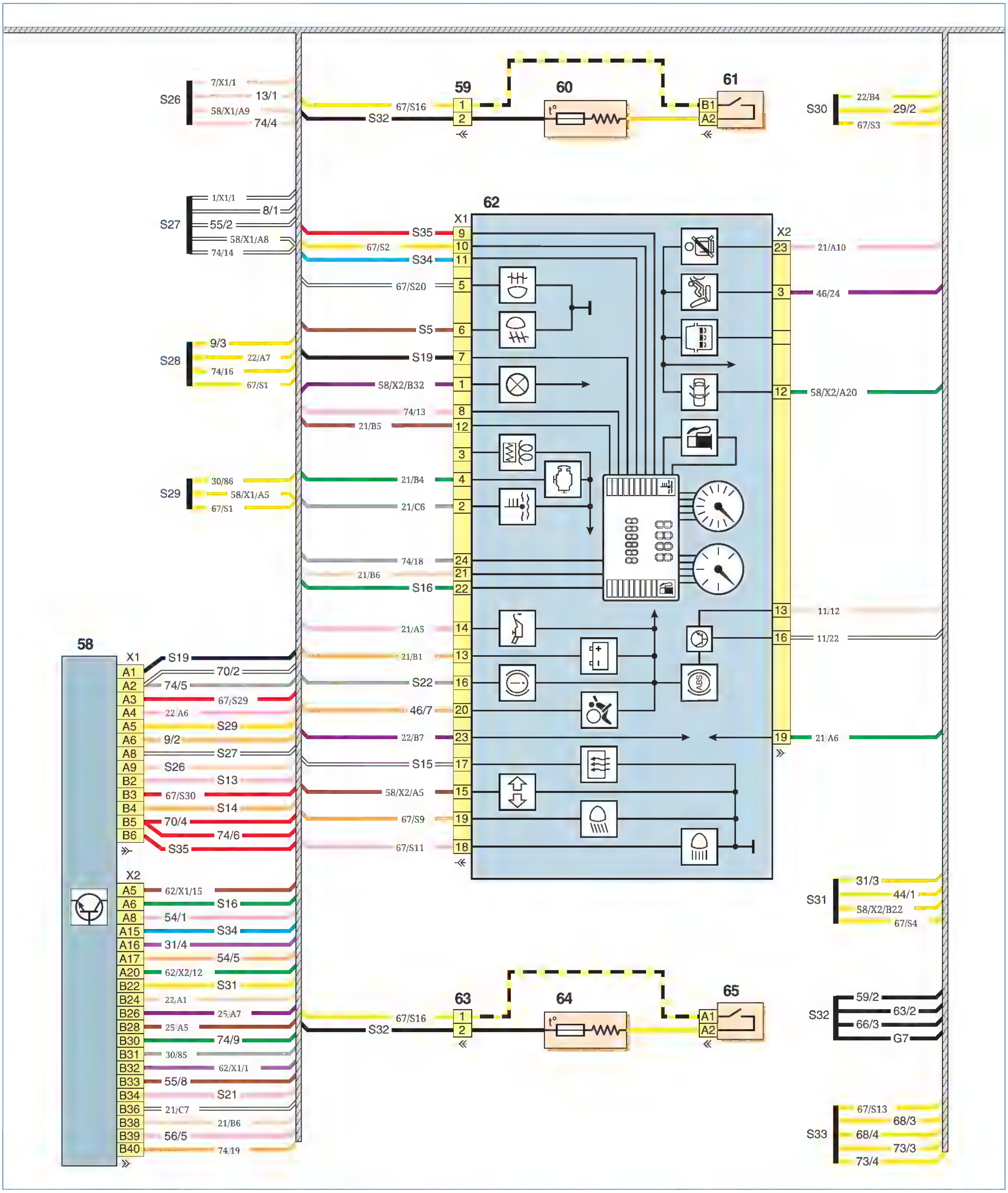
Front body wiring harness connection diagram for Sandero (options included in this diagram apply to Logan): A – point where the harness passes from the engine compartment into the cabin; **1** – right headlamp; **2** – right fog lamp; **3** – connector to the fog lamp wiring harness; **4** – left fog lamp; **5** – right high-tone horn; **6** – left low-tone horn; **7** – left headlamp; **8** – right side turn signal; **9** – windshield wiper; **10** – windshield washer; **11** – ABS control unit; **12** – brake fluid level sensor; **13** – left side turn signal; **14** – right front wheel speed sensor; **15** – relay and fuse block in the engine compartment; **16** – heater fan relay; **17** – fog lamp relay; **18**, **19** – fuses in the relay and fuse block in the engine compartment; **20** – left front wheel speed sensor; **21** – connector to the engine wiring harness;


A
22
S10
22/B3
25/A6
S11
S18
S19
A4
B7
B6
B5
B1
B3
B4
B2
A6
A3
A1
A2
A7
10/1
62/X1/23
10/2
S10
S30
74/2
58/X1/A4
9/4
58/X2/B24
9/5
S28
S12
32/1
67/E14
67/E38
67/E27
23
24
1
2
46/10
46/11
25
S13
34/1
43/1
58/X1/B2
74/10
17/86
58/X2/B26
58/X2/B28
S10
67/E19
S8
S8
S9
67/E17
67/E12
67/E10
67/E20
S14
34/3
43/3
58/X1/B4
74/20
S15
30/87
62/X1/17
67/E21
74/1
S16
11/23
21/C5
58/X2/A6
62/X1/22
S17
38/5
52/2
53/2
57/2
71/B3
72/B2
G4
S18
40/5
44/4
54/2
55/6
70/3
S11
S19
31/2
44/5
51/A6
58/X1/A1
62/X1/7
S11
S20
11/20
29/1
74/8
S21
11/11
21/B7
44/7
46/9
58/X2/34
S22
12/1
62/X1/16
69
S23
21/C1
27/85
28/86
S24
19/S
27/30
28/30
S25
27/87
49/1
49/5
G3
26/X1/A8
G4
S17
X1
26
S35
51/A7
S34
S36
G3
A1
A6
A7
A8
X2
75/6
75 16
36/A1
36 A2
41 A1
41 A2
75/5
75/15
B1
B2
B3
B4
B5
B6
B7
B8
27
S24
S25
21/C3
S23
30
87
86
85
28
S24
49/3
S23
21/C2
29
S20
S30
1
2
3
4
30
67/S32
S15
S29
58/X2/B31
31
S19
S31
58/X2/A16
32
33
21/A1
S12
67/E2
S8
6
1
3
4
SAMD

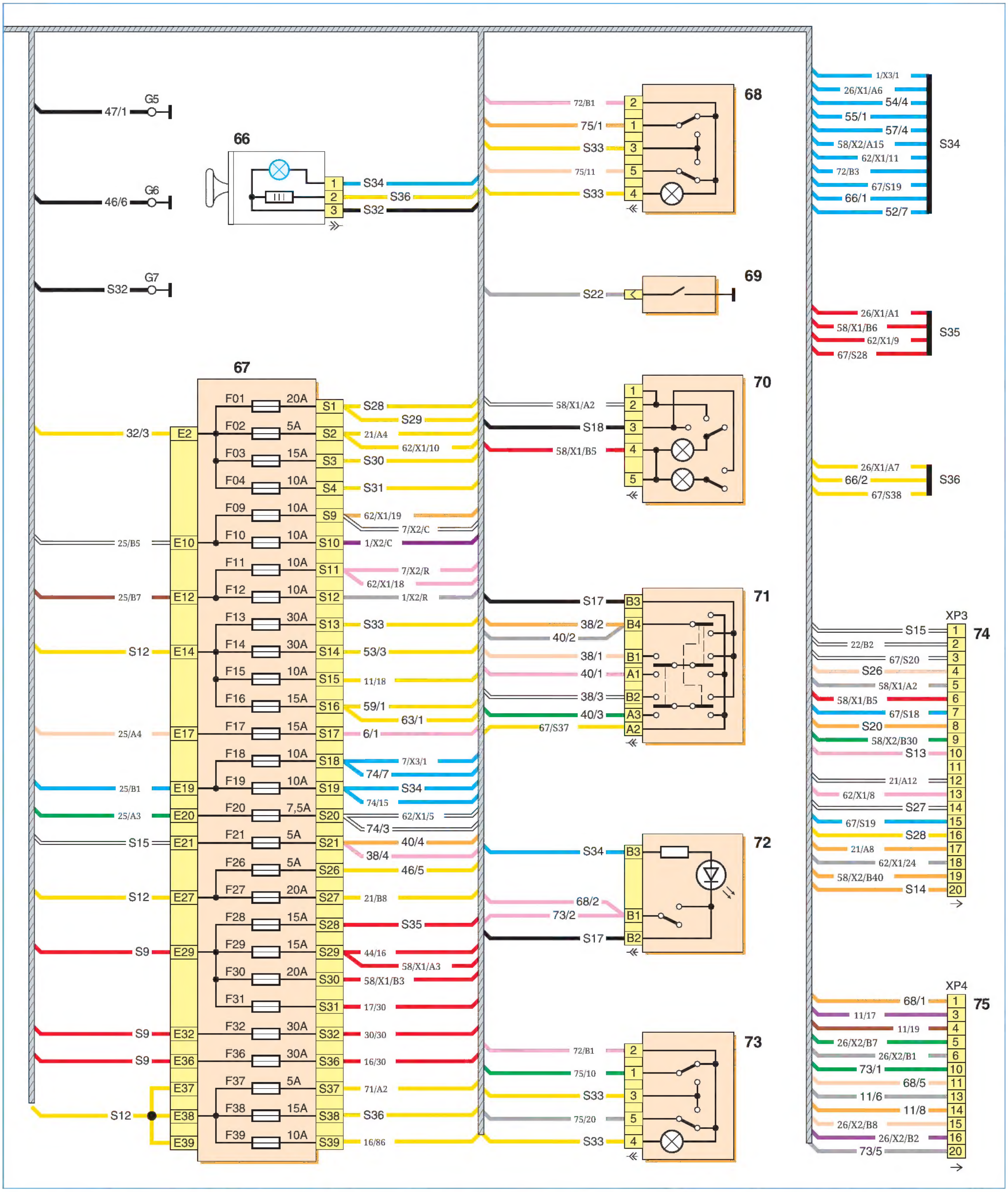
22 – right steering column switch; **23** – driver airbag; **24** – spiral cable; **25** – left steering column switch;**26** – audio system connection socket; **27** – auxiliary cabin heater relay (**70** A); **28** – auxiliary cabin heater relay (**40** A); **29** – brake pedal position sensor and brake light switch; **30** – rear window defogger relay; **31** – immobilizer coil; **32** – connector to the ignition switch wiring harness; **33** – ignition switch; **34** – right front door lock actuator; **35** – right front window regulator; **36** – right front speaker; **37** – right exterior mirror; **38** – connector to the right exterior mirror; **39** – left exterior mirror; **40** – connector to the left exterior mirror; **41** – left front


34
M
S13
S14
35
53/5
53/1
36
A1
A2
26/X2/B3
26/X2/B4
37
38
71/B1
71/B4
71/B2
67/S21
S17
39
40
71 A1
71/B4
71/A3
67/S21
S18
41
26/X2/B5
26/X2/B6
42
57/5
57/1
43
44 45
S31
S18
S19
S21
21/A9
67/S29
46
67/S26
G6
62/X1/20
52/5
S21
24/1
24/2
52/3
52/4
52/6
62/X2/3
47
48
G5
51/B6
49
S25
28/87
50
t°
51/B5
51/B4
51/B3
51/B2
51
21/B3
21/A7
S19
26/X1/A6
16/87
50/3
50/2
50/4
50/1
47/2
A8
A5
A6
A7
B1
B2
B3
B4
B5
B6
XS2
52
S17
46/13
46/14
46/8
46 15
S34
53
35/1
67/S14
57/3
35/2
57/4
54
54/3
58/X2/A17
54/2
58/X2/A8
55
58/X2/B33
S27
56
58/X2/B39
57/2
57
56/3
42/1
53/3
42/2
53/4

speaker; **42** – left front door power window; **43** – left front door lock actuator; **44** – diagnostic connector; **45** – diagnostic connector cover with jumper; **46** – airbag control unit; **47** – connector to heater fan wiring harness; **48** – heater fan; **49** – auxiliary cabin heater; **50** – blower motor resistor pack; **51** – ventilation, heating and air conditioning control unit; **52** – connector to front passenger airbag and glovebox light wiring harness; **53** – right front door power window switch; **54** – central locking switch; **55** – hazard warning switch; **56** – rear window defogger switch; **57** – left front door power window switch;

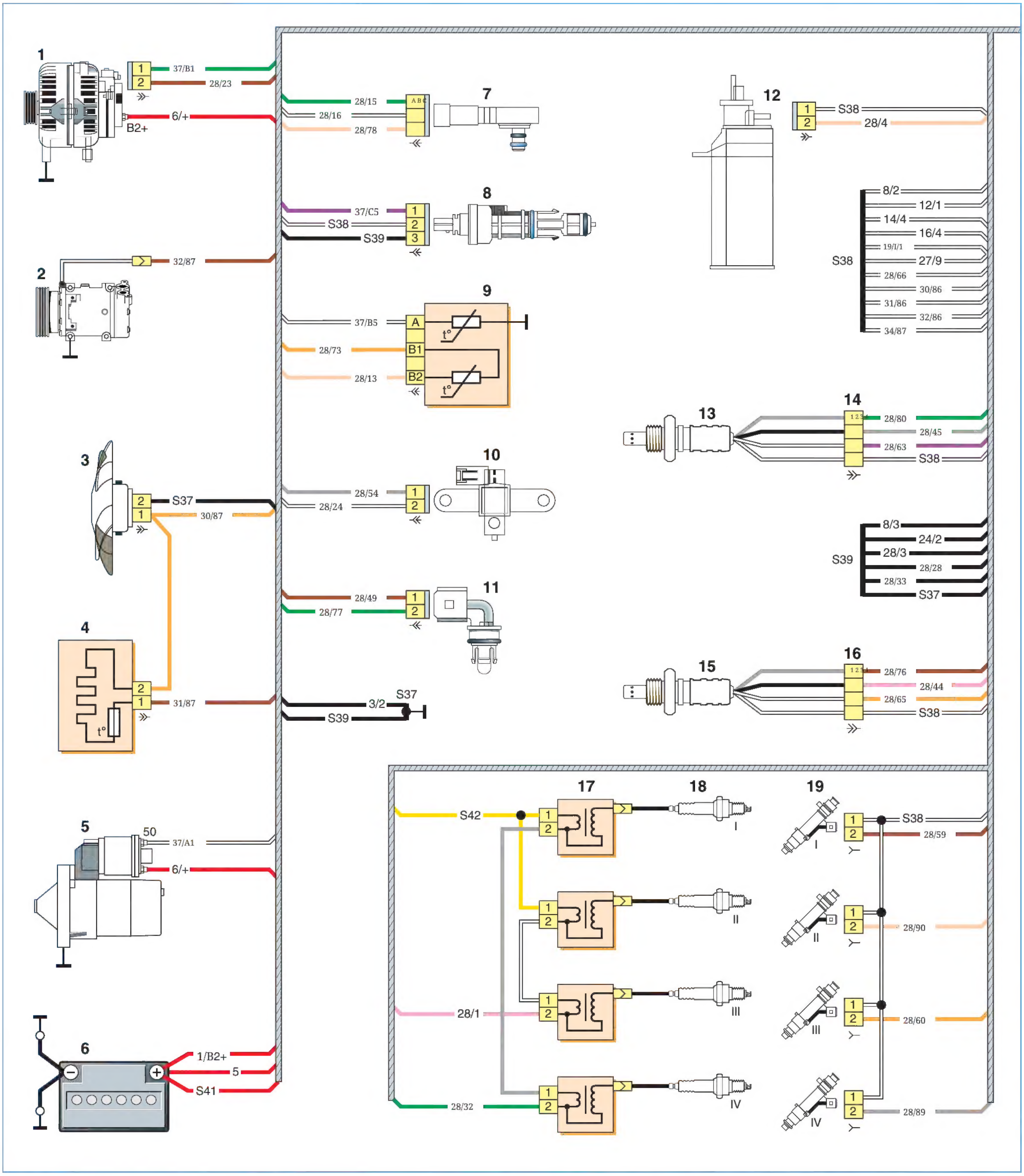

S26
7/X1/1
13/1
58/X1/A9
74/4
59
67/S16
S32
1
2
60
t°
61
B1
A2
S30
22/B4
29/2
67/S3
S27
1/X1/1
8/1
55/2
58/X1/A8
74/14
62
X1
S35
9
67/S2
10
S34
11
67/S20
5
S5
6
S19
7
58/X2/B32
1
74/13
8
21/B5
12
3
21/B4
4
21/C6
2
74/18
24
21/B6
21
S16
22
21/A5
14
21/B1
13
S22
16
46/7
20
22/B7
23
S15
17
58/X2/A5
15
67/S9
19
67/S11
18
X2
23
21/A10
3
46/24
12
58/X2/A20
13
11/12
16
11/22
19
21 A6
S28
9/3
22/A7
74/16
67/S1
S29
30/86
58/X1/A5
67/S1
58
X1
A1
A2
A3
A4
A5
A6
A8
A9
B2
B3
B4
B5
B6
S19
70/2
74/5
67/S29
22 A6
S29
9/2
S27
S26
S13
67/S30
S14
70/4
74/6
S35
X2
A5
A6
A8
A15
A16
A17
A20
B22
B24
B26
B28
B30
B31
B32
B33
B34
B36
B38
B39
B40
62/X1/15
S16
54/1
S34
31/4
54/5
62/X2/12
S31
22 A1
25 A7
25 A5
74/9
30/85
62/X1/1
55/8
S21
21/C7
21/B6
56/5
74/19
S31
31/3
44/1
58/X2/B22
67/S4
63
67/S16
S32
1
2
64
t°
65
A1
A2
S32
59/2
63/2
66/3
G7
S33
67/S13
68/3
68/4
73/3
73/4

58 – junction block; **59** – connector to the right front seat heater harness; **60** – heating element of the right front seat; **61** – right front seat heater switch; **62** – instrument cluster;**63** – connector to the left front seat heater harness; **64** – heating element of the left front seat; **65** – left front seat heater switch; **66** – cigarette lighter; **67** – interior fuse block;

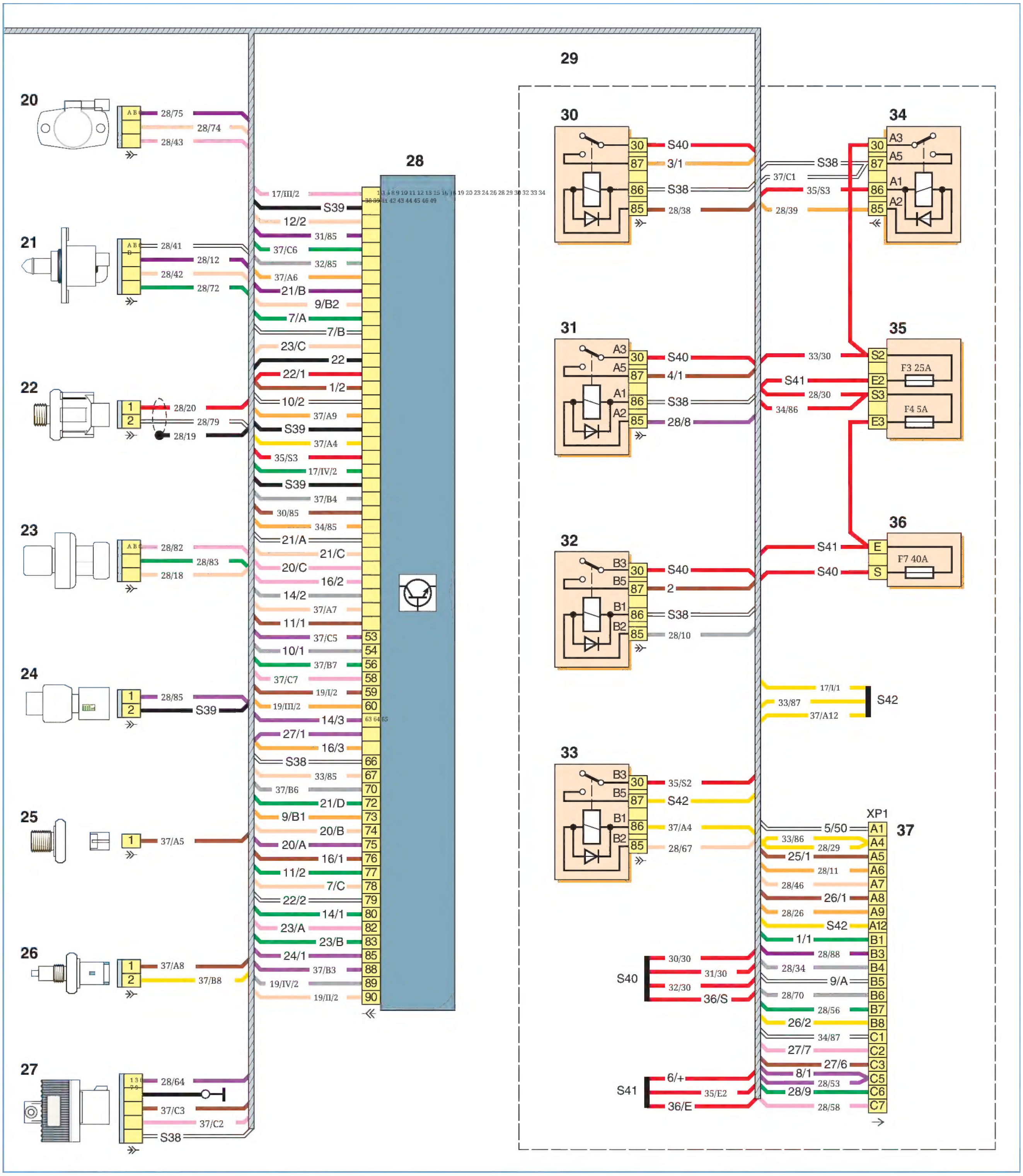


66
67
68
69
70
71
72
73
74
75
G5
47/1
G6
46/6
G7
S32
S34
S36
S32
32/3
25/B5
25/B7
S12
25/A4
25/B1
25/A3
S15
S12
S9
S9
S9
S12
E2
E10
E12
E14
E17
E19
E20
E21
E27
E29
E32
E36
E37
E38
E39
F01 20A
F02 5A
F03 15A
F04 10A
F09 10A
F10 10A
F11 10A
F12 10A
F13 30A
F14 30A
F15 10A
F16 15A
F17 15A
F18 10A
F19 10A
F20 7,5A
F21 5A
F26 5A
F27 20A
F28 15A
F29 15A
F30 20A
F31
F32 30A
F36 30A
F37 5A
F38 15A
F39 10A
S1
S2
S3
S4
S9
S10
S11
S12
S13
S14
S15
S16
S17
S18
S19
S20
S21
S26
S27
S28
S29
S30
S31
S32
S36
S37
S38
S39
S28
S29
21/A4
62/X1/10
S30
S31
62/X1/19
7/X2/C
1/X2/C
7/X2/R
62/X1/18
1/X2/R
S33
53/3
11/18
59/1
63/1
6/1
7/X3/1
74/7
S34
74/15
62/X1/5
74/3
40/4
38/4
46/5
21/B8
S35
44/16
58/X1/A3
58/X1/B3
17/30
30/30
16/30
71/A2
S36
16/86
72/B1
75/1
S33
75/11
S33
S22
58/X1/A2
S18
58/X1/B5
S17
38/2
40/2
38/1
40/1
38/3
40/3
67/S37
B3
B4
B1
A1
B2
A3
A2
S34
68/2
73/2
S17
72/B1
75/10
S33
75/20
S33
1/X3/1
26/X1/A6
54/4
55/1
57/4
58/X2/A15
62/X1/11
72/B3
67/S19
66/1
52/7
S34
26/X1/A1
58/X1/B6
62/X1/9
67/S28
S35
26/X1/A7
66/2
67/S38
S36
XP3
S15
22/B2
67/S20
S26
58/X1/A2
58/X1/B5
67/S18
S20
58/X2/B30
S13
21/A12
62/X1/8
S27
67/S19
S28
21/A8
62/X1/24
58/X2/B40
S14
XP4
68/1
11/17
11/19
26/X2/B7
26/X2/B1
73/1
68/5
11/6
11/8
26/X2/B8
26/X2/B2
73/5

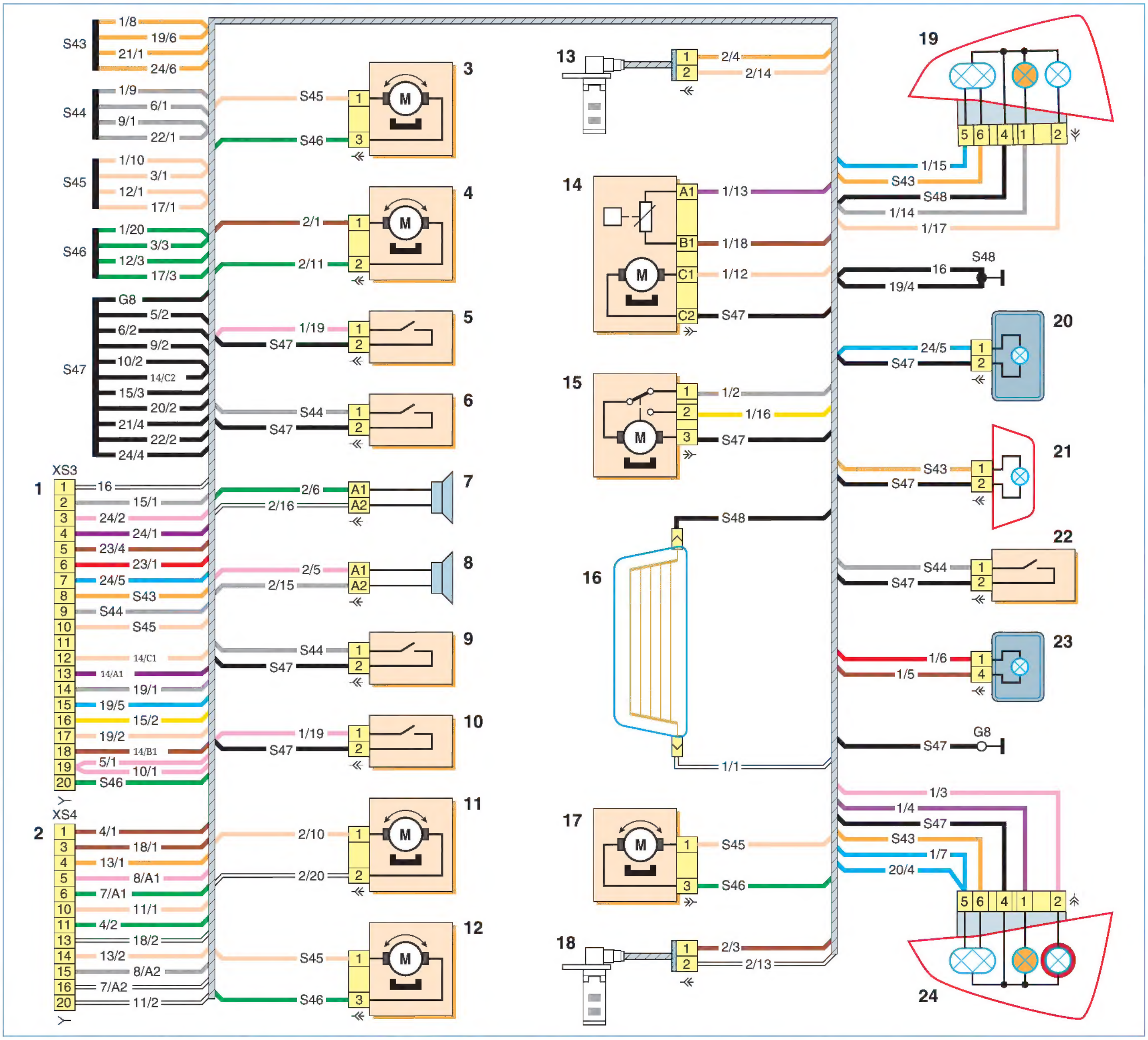
68 – right rear door power window switch; **69** – parking brake engaged and brake system fault indicator switch; **70** – interior light; **71** – exterior mirror electric control switch; **72** – rear window lock switch; **73** – left rear door power window switch; **74**, **75** – connectors to the rear body wiring harness


1
1
2
37/B1
28/23
6/+
B2+
2
32/87
3
2
1
S37
30/87
4
2
1
31/87
t°
5
50
37/A1
6/+
6
1/B2+
5
S41
7
A B C
28/15
28/16
28/78
8
37/C5
S38
S39
1
2
3
9
37/B5
28/73
28/13
A
B1
B2
t°
t°
10
28/54
28/24
1
2
11
28/49
28/77
1
2
3/2
S37
S39
12
1
2
S38
28/4
S38
8/2
12/1
14/4
16/4
19/I/1
27/9
28/66
30/86
31/86
32/86
34/87
13
14
28/80
28/45
28/63
S38
S39
8/3
24/2
28/3
28/28
28/33
S37
15
16
28/76
28/44
28/65
S38
17
18
19
S42
28/1
28/32
I
II
III
IV
S38
28/59
28/90
28/60
28/89
1
2

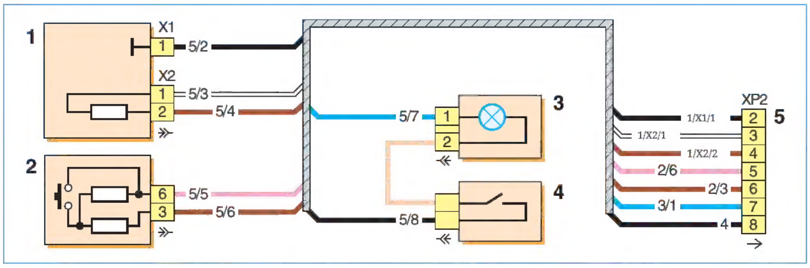
Wiring harness diagram for the 1.6 (16V) engine: 1 – alternator; **2** – air conditioning compressor; **3** – cooling fan; **4** – auxiliary resistor; **5** – starter; **6** – battery; **7** – manifold absolute pressure sensor; **8** – vehicle speed sensor; **9** – coolant temperature sensor; **10** – crankshaft position sensor; **11** – intake air temperature sensor; **12** – charcoal canister purge valve; **13** – oxygen sensor (controller); **14** – connector to the wiring harness for the oxygen sensor (controller); **15** – diagnostic oxygen sensor; **16** – connector to the wiring harness for the diagnostic oxygen sensor; **17** – ignition coils; **18** – spark plugs;


20
28/75
28/74
28/43
21
28/41
28/12
28/42
28/72
22
1
2
28/20
28/79
28/19
23
28/82
28/83
28/18
24
1
2
28/85
S39
25
1
37/A5
26
1
2
37/A8
37/B8
27
28/64
37/C3
37/C2
S38
28
17/III/2
S39
12/2
31/85
37/C6
32/85
37/A6
21/B
9/B2
7/A
7/B
23/C
22
22/1
1/2
10/2
37/A9
S39
37/A4
35/S3
17/IV/2
S39
37/B4
30/85
34/85
21/A
21/C
20/C
16/2
14/2
37/A7
11/1
37/C5
10/1
37/B7
37/C7
19/I/2
19/III/2
14/3
27/1
16/3
S38
33/85
37/B6
21/D
9/B1
20/B
20/A
16/1
11/2
7/C
22/2
14/1
23/A
23/B
24/1
37/B3
19/IV/2
19/II/2
53
54
56
58
59
60
63 64 65
66
67
70
72
73
74
75
76
77
78
79
80
82
83
85
88
89
90
29
30
30
87
86
85
S40
3/1
S38
28/38
34
30
87
86
85
A3
A5
A1
A2
S38
37/C1
35/S3
28/39
31
A3
A5
A1
A2
30
87
86
85
S40
4/1
S38
28/8
35
33/30
S41
28/30
34/86
S2
E2
S3
E3
F3 25A
F4 5A
32
B3
B5
B1
B2
30
87
86
85
S40
2
S38
28/10
36
S41
S40
E
S
F7 40A
17/I/1
33/87
37/A12
S42
33
B3
B5
B1
B2
30
87
86
85
35/S2
S42
37/A4
28/67
S40
30/30
31/30
32/30
36/S
S41
6/+
35/E2
36/E
XP1
37
5/50
33/86
28/29
25/1
28/11
28/46
26/1
28/26
S42
1/1
28/88
28/34
9/A
28/70
28/56
26/2
34/87
27/7
27/6
8/1
28/53
28/9
28/58
A1
A4
A5
A6
A7
A8
A9
A12
B1
B3
B4
B5
B6
B7
B8
C1
C2
C3
C5
C6
C7

19 – injectors; **20** – throttle position sensor; **21** – idle speed control; **22** – knock sensor; **23** – refrigerant pressure sensor; **24** – power steering system pressure sensor; **25** – low oil pressure sensor; **26** – reverse light switch; **27** – auxiliary cabin heater relay; **28** – engine control unit (controller); **29** – fuse and relay block in the engine compartment; **30** – high-speed cooling fan relay; **31** – low-speed cooling fan relay; **32** – air conditioner compressor relay; **33** – fuel pump and ignition coil relay; **34** – main relay; **35**, **36** – fuses in the engine compartment relay and fuse block; **37** – connector to the body wiring harness


S43
1/8
19/6
21/1
24/6
S44
1/9
6/1
9/1
22/1
S45
1/10
3/1
12/1
17/1
S46
1/20
3/3
12/3
17/3
S47
G8
5/2
6/2
9/2
10/2
14/C2
15/3
20/2
21/4
22/2
24/4
XS3
1
16
15/1
24/2
24/1
23/4
23/1
24/5
S43
S44
S45
14/C1
14/A1
19/1
19/5
15/2
19/2
14/B1
5/1
10/1
S46
XS4
2
4/1
18/1
13/1
8/A1
7/A1
11/1
4/2
18/2
13/2
8/A2
7/A2
11/2
3
M
4
2/1
2/11
5
1/19
6
7
2/6
2/16
A1
A2
8
2/5
2/15
9
10
11
2/10
2/20
12
13
2/4
2/14
14
1/13
1/18
1/12
15
1/2
1/16
16
S48
1/1
17
18
2/3
2/13
19
1/15
1/14
1/17
19/4
20
24/5
21
22
23
1/6
1/5
24
1/3
1/4
1/7
20/4

Wiring diagram of the rear body harness of the Sandero: 1, **2** – connectors to the front body harness; **3** – right rear door lock actuator; **4** – right rear door power window; **5** – dome light switch at the right front door; **6** – dome light switch at the right rear door; **7** – right rear speaker; **8** – left rear speaker; **9** – dome light switch at the left rear door; **10** – dome light switch at the left front door; **11** – left rear door power window; **12** – left rear door lock actuator; **13** – right rear wheel speed sensor; **14** – fuel module; **15** – rear hatch window washer; **16** – rear window heating element; **17** – rear hatch lock actuator; **18** – left rear wheel speed sensor; **19** – right rear lamp; **20** – license plate light; **21** – additional brake light; **22** – trunk light switch; **23** – trunk light; **24** – left rear lamp


1
X1
5/2
X2
5/3
5/4
2
5/5
5/6
3
5/7
4
5/8
XP2
5
1/X1/1
1/X2/1
1/X2/2
2/6
2/3
3/1
4

Wiring diagram of the front passenger airbag and glove box lighting harness: 1 – front passenger airbag; **2** – front passenger airbag switch;**3** – glove box light fixture; **4** – glove box light switch; **5** – connector to the front wiring harness